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FIG. 5 (WETZEL). ANEURYSM OF THE INTERNAL CAROTID ARTERY.

ATE 3 AMERICAN JOURNAL OF OPHTHALMOLOGY
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ANEURYSM OF THE INTERNAL CAROTID ARTERY WITH ATROPHY AND COMPRESSION OF THE OPTIC NERVE

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A patient who complained of failing of vision in the left eye and pains in the left side of the head was observed at intervals over the course of one year. Fundus examination showed, on the left side, secondary optic atrophy, increase of connective tissue on the nerve head, and progressive atrophic excavation of the nerve head. Visual-field studies revealed progressive contraction for form in the left eye. Death occurred in coma shortly after a sudden attack of severe headache. Autopsy showed leptomeningeal and cortical hemorrhage and an aneurysm of the left internal carotid artery, over the surface of which was stretched the flattened and partially degenerated left optic nerve. There were evidences of renal and vascular disease, and no evidence of syphilis.

Recent opinion gives arteriosclerosis and bacterial infection, especially progressive malignant endocarditis, acting on a congenitally weak vessel wall, as the most frequent causes of aneurysm. A review of the finer anatomy of the region suggests the mode of action by which aneurysm of the internal carotid artery may compress the optic nerve and bring about its atrophy.

Clinical diagnosis before rupture of the aneurysm is rare. The clinical picture varies widely with the rate of development of the aneurysm.

Cases of aneurysm of the internal carotid artery producing pressure changes in the optic nerve appear to be sufficiently rare to merit full reporting. In 1929 Albright[1] collected 30 cases of aneurysms at or near the junction of the internal carotid artery and the circle of Willis, giving rise to symptoms and verified at autopsy or operation, and added two personal cases. In 1934 McKinney[2] reviewed the literature since 1850 and found 22 cases of aneurysm of the intracranial portion of the internal carotid artery confirmed at autopsy or operation or by definite X-ray findings. Woods and Rowland[3] found that of 138 cases of optic-nerve disease, 1.5 percent were due to intracranial aneurysm. Saphir[4] noted that Michel, in 1877, was probably the first to describe changes in the optic nerve due to compression by a diseased carotid artery. In a case with the clinical diagnosis of edema of the papilla, dilated or markedly tortuous internal carotid arteries were revealed which pressed upon the optic nerves. Histologically, Michel records that there were found hyperemia and diffuse round-cell infiltration of the optic nerves with preservation of the nerve fibers.

The case that I have to report is as follows:

On October 26, 1932, Mrs. E. H. H., aged 39 years, a housewife, complained of failing vision of the left eye. She had noticed that vision was failing two years before the time of her first visit. The family history was irrelevant. She had always been well prior to the time of her last pregnancy, nine years ago, and dated most of her ocular complaint from that time.

The ocular examination showed that vision in the right eye was 6/7.5 plus and in the left 6/60. The external ocular structures were normal as was also the fundus of the right eye; that of the left eye showed a secondary optic atrophy. Perivasculitis was noted in places in the nasal portion of the retina. Field studies were made (fig. 1). The intraocular tension was 19 mm. (Schiötz) in each eye. The patient was sent to the hospital for a general physical examination. Blood pressure was 180 systolic and 110 diastolic. The blood count was

normal. Urinalysis showed three-plus albumin. The Kahn reaction of the blood was negative. Several teeth showed evidence of infection. The tonsillar stumps revealed infection and there was an infected mass of adenoid tissue in the nasopharynx. A roentgenogram of the region of the sella turcica showed normal outlines of the sella and no erosion of the clinoid processes.

The infected teeth, tonsillar stumps, and adenoid tissue in the nasopharynx were removed.

On January 2, 1933, the patient returned because of severe pain in the left side of the head. Corrected vision in the right eye was 6/5; in the left eye 6/60, blurred. There was no evidence of any recent extraocular disturbance. The findings on fundus examination were practically the same as on the previous visit. Another medical survey was made, and this and the neurological examination which followed failed to shed any light on the cause of the headaches. The Kahn test of the spinal fluid was negative. A visual-field study (fig. 2) showed a greater contraction for form in the left eye than did the study made on the first visit.

The patient visited relatives in a distant state and was not seen again until August 24th. At that time the uncorrected vision in the right eye was 6/7.5; in the left eye finger counting at 0.60 meter. The findings on external examination were essentially the same as on the previous visits. Fundus examination of the right eye showed no change from the previous visit. Examination of the left eye showed an increase in connective-tissue deposit on the nerve head. The atrophic excavation of the nerve head was more pronounced and the mottling of the fibers of the lamina cribrosa could be seen plainly. The pain in the patient's head was less severe.

On October 23, 1933, the patient appeared to be in her usual state of health, but after eating her dinner she complained of a sudden severe headache, lapsed into coma, and died within an hour.

The necropsy report on the head was as follows:

Brain: Extensive hemorrhage in the leptomeninges, spreading over the cortex of both the cerebrum and cerebellum.

Dura mater: Negative.

Medulla: Meningeal hemorrhage. Edema.

Pituitary body: Pressure atrophy. Eosinophile cells in excess over basophiles.

Right optic nerve: No lesion.

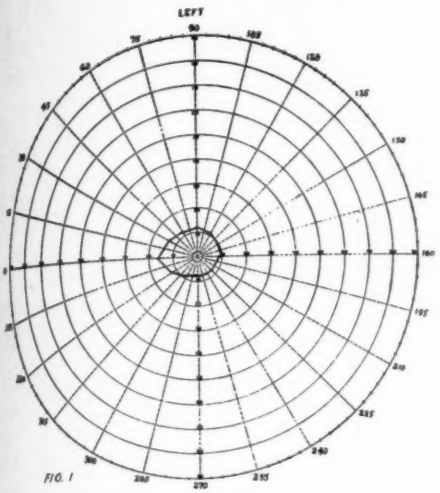
Left optic nerve: The left optic nerve was disposed as a much stretched and flattened ribbon over the surface of an aneurysm of the left internal carotid artery. In the least-flattened portion there were many myelinated nerve fibers, but in the thinner part there was nearly complete degeneration, only the stromal elements persisting.

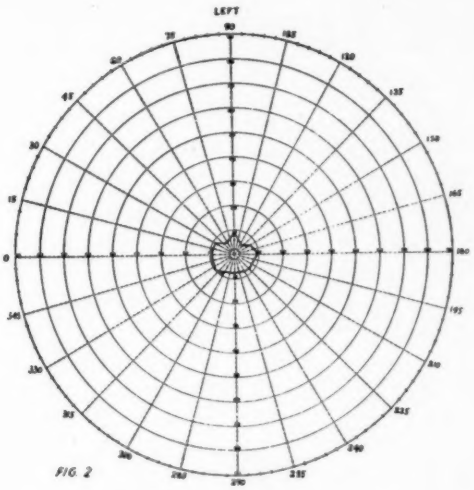
Aneurysm of the left internal carotid artery: The artery wall was greatly thinned and in part was without the usual musculature and elastic layers. There was a well-marked productive inflammation of the intima. Evidence of syphilitic arteritis was absent.

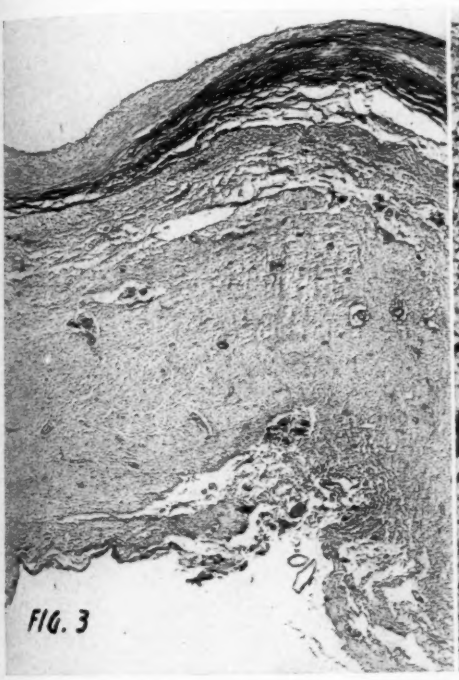
Little cerebral artery: Lumen dilated. Wall somewhat thinned. No other lesion.

A summary of the changes found elsewhere in the body is as follows: Slight atherosclerosis of the aorta. Subepicardial fatty infiltration. Slight subendocardial degenerative fatty infiltration. Hypertrophy and patchy-brown atrophy of the heart muscle, and slight myocardial fibrosis. Acute passive congestion of the lungs with hemorrhage by diapedesis. Slight atrophy of the liver, with cloudy swelling, passive congestion, and patchy interlobular cirrhosis. Advanced nephropathia arteriosclerotica. Primary contracted kidney. Active renal inflammatory foci. Lipoidosis of the epithelium in occasional renal tubules. Moderate atrophy with hypoplasia of the adrenals, with cortical lipoidosis. Passive congestion of the spleen. Iodized-Graves's-constitution thyroid with adenoma. Hyperplastic thymus with old tuberculosis. Old recurrent appendicitis.

The pathologist remarked: "This aneurysm would seem to depend for its etiology upon the combined vascular and renal disease. Was this patient not







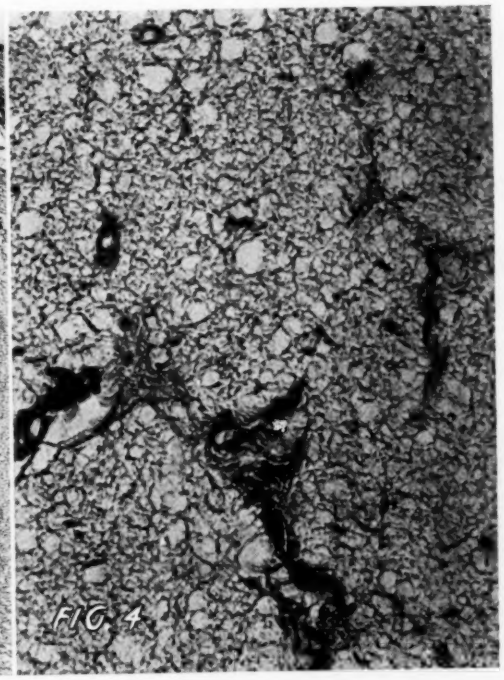


Fig. 1 (Wetzel). Left field as of October 26, 1932.
Fig. 2 (Wetzel). Left field as of January 2, 1933, showing greater contraction for form.
Fig. 3 (Wetzel). Photomicrograph of the wall of the aneurysm with left optic nerve. Phosphotungstic acid hematoxylin preparation. × 22.
Fig. 4 (Wetzel). Photomicrograph of left optic nerve. Phosphotungstic acid hematoxylin preparation. × 270.

hypertensive at one time? While syphilitic etiology is always suspected in these cases, the only suggestions of syphilis in this patient are the slight interlobular cirrhosis and the plasma-cell infiltrations in the adrenal medulla. These are not sufficient for a diagnosis of lues."

The microscopic pictures of the wall of the aneurysm and of the optic nerves are shown in figures 3 and 4.

Garvey[5] stated that the most frequent cause of degeneration of the vessel walls leading to aneurysm is arteriosclerosis and that this is often a patchy disease, detectable only by careful microscopic examination. The next most frequent cause he found to be bacterial infection, especially progressive malignant endocarditis, with impaction of emboli in the lumen. He ascribed a minor role to syphilis. Trauma is a frequent cause of arteriovenous aneurysm in the cranium, but is seldom a cause of the type of aneurysm here under discussion.

Moore[6] reported a case of "mycotic aneurysm" described at necropsy as being in the right ophthalmic artery and probably involving the end of the internal carotid and the beginnings of the anterior cerebral and posterior communicating arteries. The patient had malignant endocarditis. Following a sudden, severe frontal headache, he woke to find himself totally blind in the right eye. The fundus was essentially normal and there was no positive evidence of retrobulbar neuritis. Several days later a defect of the upper temporal field of the right eye was noted. It was thought that the explanation must lie in compression of the optic nerve somewhere in front of the optic chiasm, and an aneurysm was suspected. This case was most unusual, in that the optic nerve was found completely ruptured. In Moore's opinion the embolus lodged in the artery at the time of the sudden pain in the head and the rupture of the nerve is explained by the suddenness of the stretching to which it was subjected by the rapid development of the aneurysm. When stretching of the nerve takes place slowly, as in the case of a slowly developing pituitary tumor or a gradual dilatation of a weakened vessel, the nerve is thinned and flattened, but will undergo extreme distortion and elongation without rupture. The fact that what we term pressure on the nerve is frequently in these cases more properly stretching of the nerve was emphasized by Paton.[7] The nerve is lifted by the aneurysm and carried on its surface, where it is subjected to the combination of pressure and traction. This was the situation in our case (fig. 5).

Congenital weakness of the vessel walls is at least a predisposing factor of aneurysm, but it may be that arteriosclerotic disease of the vessel is necessary for the development of aneurysm in the predisposed wall. Congenital defects in the medial wall of a vessel are most often found at points where the vessel divides, and it is at such points that we find most commonly an aneurysm of the internal carotid. Other congenital abnormalities are sometimes noted. Thus, one of Albright's[1] patients had a deformity of the left hand, with which he had been born; certain of the terminal phalanges appeared to be missing. Necropsy showed on the right side a small aneurysmal sac, the mouth of which opened into the middle cerebral artery very close to its origin from the carotid. A very small branch, probably one of the anterior lateral ganglionic branches, opened from the middle cerebral artery just at the orifice of the aneurysmal sac. It is difficult to determine whether the sac really rose from the middle cerebral or from this smaller branch. On the left side there was another sac apparently arising from a symmetrical position. This sac had ruptured, forming a false aneurysm. The left third nerve was flattened out on the surface of the sac.

A clear idea of the finer anatomy of the course of the optic nerve as it approaches the circle of Willis and of the intimate relations of the vessels of this region to the optic nerve is helpful in understanding the mode of action of the aneurysm in compressing the nerve. According to Favaloro[8] we have here a "true zone of peril." The optic nerve rests, inferiorly, on the internal carotid artery at the point at which the latter forms an arch with convexity upward and gives origin to the ophthalmic artery. The roof of the optic canal is prolonged backward by a firm membranous fold of the dura mater, and for this reason the optic nerve at this

point is susceptible of compression when the course and curvature of the carotid and ophthalmic arteries are modified by atheromatous changes and still more when the atheromatous changes of the vessel walls have been followed by aneurysm (Gabardi[9]). In all of Saphir's[4] six cases of arteriosclerosis of the internal carotid artery, with aneurysm in four, the optic nerves showed pressure marks in just this region. Löwenstein[10] mentioned three dangerous areas, pointing out that the researches of Liebrecht, of Bernheimer, and of Otto have demonstrated that pressure by the sclerotic vessel does not take effect in the bony canal, but in the continuation of this canal toward the cranial cavity. Here, where the ophthalmic artery "bores longitudinally into the optic nerve," he sees the first point of danger. The second is the sharp upper edge of the fibrous canal as it runs toward the cranial cavity, against which the ascending carotid squeezes the optic nerve. The third point of danger lies between the canal and the chiasm, where the carotid and the anterior cerebral arteries cross below and above the optic nerve. The pressure, Löwenstein insisted, is always from the carotid and never from the ophthalmic artery.

A few more words may be given to the role of the ophthalmic artery in respect to lesions of the optic nerve. The most marked changes have been observed at the level of the arch of the carotid where the ophthalmic artery branches off. But numerous necropsy reports show only the dilated carotid artery exerting direct pressure on the nerve and this only in the membranous portion of the canal. Within the canal, moreover, the ophthalmic artery is enveloped in folds of the dura mater, which, being fibrous and inelastic, would not permit the artery to press upon the nerve. But in the pathogenesis of lesions of the optic nerve, one may well take into account the fact that sclerotic changes in the ophthalmic artery might be able to determine nutritional disturbances of this nerve, with atrophy as the end result. Gabardi,[9] who discusses this matter at some length, is of the opinion that compressive and nutritive factors are associated in the determination of the optic-nerve lesions.

A possible secondary pressure factor is mentioned by Saphir. He noted hyperemia of the small veins in the superficial portion of the nerve in some of his cases of changes in the optic nerve resulting from pressure of arteriosclerotic internal carotid arteries. This hyperemia, indicative of impaired venous return, might, he thought, constitute an additional pressure phenomenon.

Aneurysm of the internal carotid artery is rarely diagnosed *intra vitam* and prior to rupture as the cause of an atrophy of the optic nerve. Considerable gross change in the nerve is compatible with very slight functional disturbance. Saphir was surprised at the discrepancy between the gross and the microscopic changes in the nerves in his six cases. These changes were necropsy findings; the patients had made no complaints relative to the eyes. On the basis of six cases studied at the eye clinic of the University of Bologna, Gabardi[11] stated that there is no characteristic nor pathognomonic syndrome for aneurysm or calcification of the intracranial portion of the internal carotid, but there are ophthalmoscopic and field-measurement findings which suggest the correct diagnosis. Gabardi described two ophthalmoscopic pictures; in the first, temporal pallor of the papilla, total pallor, and accentuated pseudoglaucomatous excavation; in the second picture, which is found in a minority of cases, there is papillary stasis or its end results (postpapillitic atrophy). He ascribed the difference to the mode in which the compression becomes stabilized. If the compression occurs rapidly and in the portion of the optic nerve corresponding to the entrance into the canal, the sudden obstruction to the blood and lymph circulation in the nerve will give rise to a picture of stasis more or less marked. When, on the other hand, compression is exerted slowly, we have the picture of atrophy.

Beside the changes in the optic disc (stasis, or primary or secondary atro-

phy), Gabardi would have the observer look for vascular lesions—retinal hemorrhages and thinness of the arterial vessels. A study of the visual fields to detect contractions should be added. On the basis of this entire complex of symptoms Gabardi was able to make a hypothetical clinical diagnosis in one of his cases.

Radiography may be used for confirmation. If there is calcification in the walls of the aneurysm, this will show. When the aneurysm is large, the differential diagnosis may be impossible and the difficulties are increased when the visual disturbances date from far back and no reliable reports of early findings are available. In such cases the campimetric and ophthalmoscopic changes produced by the aneurysm could be indistinguishable from those produced by a tumor of the pituitary. Cavina'[12] observed a case in which an aneurysm first compressed the optic nerve of the side of the lesion and then, crossing midline, involved the contralateral optic nerve, producing a temporal hemianopsia on this side. Macular lesions, not uncommon, aid in diagnosis only when associated with ophthalmoscopic changes in the optic nerve and with changes in the peripheral limits of the visual fields. They are indirect, rather than direct, consequences of compression on the part of the artery.

Practically every type of visual-field defect has been reported in cases of aneurysm of the internal carotid artery. Defects of the visual field on the nasal side are readily explained. The optic-nerve fibers lying outwardly in the chiasm, according to Henschen,[13] supply the temporal half of the retina, the lower-lying fibers supplying the lower quadrant, the higher-lying fibers the upper quadrant. But it is more difficult to explain a central scotoma, which has often been reported. The old, and apparently still the only, explanation is that the papillomacular bundle, as most highly differentiated, sustains pressure less well than the more primitive peripheral bundles. Löwenstein, who examined early cases, thinks that rapid progress of the visual-field defect, with, it may be, appearance of a choked disc and a large central scotoma, speaks for pressure by an aneurysm of the carotid, whereas defect for color in the nasal field without central scotoma and progressing slowly, with the opthalmoscopic picture of a beginning simple atrophy of the optic nerve, suggests rather an atheromatosis of the carotid.

When aneurysm of the internal carotid artery ruptures, there is usually an apoplectic attack, with loss of consciousness and vomiting. Death may ensue before consciousness is regained. In other cases, with only small perforations in the aneurysmal sac, there is slow leakage, with time for the development of a train of symptoms. The rupture may give rise to a pseudoaneurysm of large dimensions, producing symptoms of rapid compression of the optic nerve. It is these large pseudoaneurysms that are most likely to give rise to the so-called "neighborhood signs," from direct pressure on neighboring structures, shooting pains over the upper portion of the face, ptosis, diplopia, and impairment of vision (Garvey).

The neighborhood signs were well summed up by Bartholow in 1872 who is quoted by Albright as follows: "Aneurysm of the internal carotid will affect the sense of smell by compression of the olfactory nerve; will also cause ptosis, convergent strabismus, and a dilated pupil by pressure on the motor oculi; will cause congestion of the eye and swelling of the veins of the face by compression of the cavernous sinus; and will be accompanied by intense tic douloureux, especially in the ophthalmic division, due to irritation of the fifth nerve. With the growth of the tumor, especially if that part of the artery within the carotid canal be involved, there will be noises, pulsating in character, in the ear, followed by impaired hearing, and finally by complete deafness. The facial nerve may also become involved, and paralysis of the face on the same side will be observed. Softening of the neighboring part of the middle lobe will take place, and, by reason of this, or by pressure on the crus cerebri, crossed hemiplegia will occur."

If the leakage from the artery does

not become encapsulated in a pseudo-aneurysmal sac, there will develop the usual symptoms of meningeal irritation, pain in the back of the neck, stiffness of the neck, and Kernig's sign.

Up to the present time, as has been said, the condition has seldom been diagnosed before rupture, partial or complete. With earlier diagnosis, should closer study of early symptoms make this feasible, it is possible that some patients might be helped by ligation of the common carotid artery. Ligation does not remove the aneurysm, but reduces the fullness and hence diminishes pressure.

Before closing brief mention might be made of a curious case reported by Trevani,[14] in which an aneurysm of the internal carotid artery was mistaken at operation for a parasellar tumor. The aneurysm had become organized. It presented a nodular mass measuring $5 \times 4 \times 3$ cm., over which ran the greatly flattened optic nerve. On section, the tumor consisted of grayish white layers concentrically arranged and containing fresh coagula only in the center. The right internal carotid communicated with the central cavity of the tumor at its point of exit from the cavernous sinus, the connecting bridge being of pinhead size. The patient had been almost completely blind for a year. The aneurysm in Trevani's case would appear to have been of spyhilitic origin.

1912 Olds Tower.

References

[1] Albright, F. The syndrome produced by aneurysm at or near the junction of the internal carotid artery and the circle of Willis. Bull. Johns Hopkins Hosp., 1929, v. 44, April, p. 215.

[2] McKinney, J. McD., Acree, T., and Soltz, S. E. The syndrome of the aneurysms of the intracranial portion of the internal carotid artery. Trans. Amer. Neur. Assoc., 1934, v. 60, p. 201.

[3] Woods, A. C., and Rowland, W. M. An etiologic study of a series of optic neuropathies. Jour. Amer. Med. Assoc., 1931, v. 97, Aug. 8, p. 375.

[4] Saphir, O. Changes in the optic nerve resulting from pressure of arteriosclerotic internal carotid arteries. Amer. Jour. Ophth., 1933, ser. 3, v. 16, Feb., p. 110.

[5] Garvey, P. H. Aneurysms of the circle of Willis. Arch. of Ophth., 1934, v. 11, June, p. 1032.

[6] Moore, R. F. A case of unruptured intracranial aneurysm which had caused rupture of the optic nerve, diagnosed during life. Trans. Ophth. Soc. U. Kingdom, 1926 (Session 1925), v. 45, pt. 2, p. 490.

[7] Paton, L. Classification of the optic atrophies. Proc. Roy. Soc. Med., Sect. Neurol., 1930, v. 24, Nov., p. 1.

[8] Favaloro, G. I. Ricerche di morfologia clinica sulla regione delle vie ottiche e dell'ipofiso negli stadi fetali e nell'adulto. II. Sulla patogenesi delle affezioni delle vie ottiche con particolare riguardo alle affezioni da compressione. Ann. di Ottal., 1929, v. 57, p. 354.

[9] Gabardi, E. F. Contributo alla diagnostica delle lesioni chiasmatiche da alterazioni della carotide interna. Bull. d. Sci. med., 1934, ser. 9, v. 2, July-August, p. 267.

[10] Löwenstein, A. Sehnervenschwund mit binasaler Hemianopsie durch Atheromdruck basaler Hirngefässe. Med. Klin., 1935, v. 31, Feb. 8, p. 176.

[11] Gabardi, E. F. Ulteriore contributo clinico alla conoscenza delle sindromi oculari da alterazioni delle carotide interna. Riv. Oto-Neuro-Chir., 1934, v. 11, November-December, p. 591.

[12] Cavina. Cited by Gabardi (11).

[13] Henschen. Cited by Löwenstein (10).

[14] Trevani, E. Ein als parasellarer Tumor operiertes Aneurysma der Arteria carotis interna. Zeit. f. Chir., 1932, v. 237, p. 534.

IRITIS PRODUCED IN RABBITS' EYES BY THE INTRAVENOUS INJECTION OF CRUDE AND PURIFIED CULTURES OF BACTERIA ISOLATED FROM PATIENTS WITH CERTAIN INFLAMMATORY EYE DISEASES

Preliminary report

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NEW YORK

Iritis was produced in rabbits by the intravenous injection of either primary or purified cultures from 19 to 21 patients with acute or chronic eye diseases, and in 11 of 14 controls (laboratory assistants, healthy children, and patients with arthritis and thyrotoxicosis).

Positive results were obtained with various microörganisms as follows: streptococci (alpha, beta, and gamma types), staphylococci (albus and aureus), colon bacilli, non-lactose fermenters, enterococci, and Friedländer bacilli.

Iritis was produced by 44 percent of 61 purified strains of streptococci from patients with eye disease as compared with 29 percent of 69 strains from persons in the control group.

Of the total of 134 cultures from patients with eye disease, 36 percent produced iritis while 17.9 percent were undetermined. Of the total of 118 cultures from persons in the control group, 29.2 percent produced iritis in rabbits, while 21.5 percent were undetermined. From the Lighthouse Eye Clinic of the New York Association for the Blind, and the Clinical Research Laboratory. Aided by grants from the Ophthalmological Foundation, Inc. Read before the Association for Research in Ophthalmology at Kansas City, Missouri, May 12, 1936.

Because of the possible importance of the relation of focal infection to the etiology of many acute and chronic eye diseases, a knowledge of the relationship of microörganisms to the production of ocular lesions is of vital importance. The impracticability of inoculating human volunteers has made it necessary to study this problem by means of animal experimentation. Rabbits are susceptible to the pathogenic action of many bacterial species and are less expensive than primates. Therefore, they have been used extensively, even though positive findings cannot be considered conclusive evidence of a parallel relationship to ocular disease in man.

In 1932, Rosenow and Nickel[1] summarized a series of experiments previously published by them and their associates on the elective localizing power in rabbits of freshly isolated streptococci and pneumococci derived from foci of infection of patients with various diseases. (The lesions produced in their earlier experiments had occurred only after several passages through animals of "laboratory" strains of these organisms.) They also reported a new series of experiments, following a somewhat similar method, in which iritis was produced by direct inoculation of primary cultures from patients suffering from acute, chronic, primary, or recurring attacks of iritis, uveitis, or iridocyclitis.

This report and the results of other investigations, such as those of Maestro,[2] Zanettin,[3, 4] Blanc and Martin,[5] Cusumano,[6] Wherry and King,[7] de Andrade,[8] von Herrenschwand,[9] Brown,[10, 11] Irons, Brown and Nadler,[12] Meisser and Gardner,[13] and Haden[14] stimulated the experiments to be described in this paper.

Experimental procedure

A series of patients with acute and chronic inflammatory eye diseases was studied bacteriologically. Because previous experiments had indicated that the nose and throat, even though symptomless,[15] were the foci most frequently involved in chronic or acute diseases,[16] they were chosen as the most favorable areas from which to obtain cultures. Cultures from teeth and tonsils were also used in certain instances. In most of the early experiments, separate cultures were made from the left and right nostrils but, as only minor differences were noted, subsequent cultures from both nostrils were combined.

Dextrose brain broth, made by adding approximately 3 gm. of calves' brains to about 10 c.c. of Bacto brain-heart infusion, was used for primary cultures. Each swab was placed in a tube of this medium and incubated for 18 to 24 hours. The swab was then discarded and a loopful of the culture was spread on two blood-agar plates by means of a glass spreader.[17] Following Rosenow's suggestion, blood-agar cultures were grown anaerobically. Ordinarily there was a lighter growth on the second plate, which made it easier to find discrete colonies and to differentiate the various types. Since most of the cultures proved to be mixed growths, this was important. The primary cultures were then injected intravenously into rabbits. The organisms isolated from the blood-agar plates were purified, grown for 18 hours in brain-heart infusion and tested for toxicity* by the in-vitro methods of Chapman, Berens, and their associates.[18, 19, 20, 21] The purified cultures were then injected intravenously into albino rabbits weighing between 1,400 and 1,600 gm.

In recording the occurrence of iritis, the designations two plus (++), three plus (+++) and four plus (++++) indicate the degree of iritis produced. Two plus (++) indicates definite congestion with marked engorgement of the vessels. Three plus (+++) indicates marked congestion of the iris, marked circumcorneal congestion, edema, and clouding of the iris with or without small hemorrhages. Four plus (++++) iritis indicates the same as three plus (+++) with the addition of exudate in the anterior chamber.

Chart 1

ACUTE IRITIS

Left Tonsil	2.0 c.c. Primary ++++	Colon Bacillus	2.0 c.c. ++++
			5.0 c.c. ++++
		α Strep. (5-5)	2.0 c.c. No Effect
	5.0 c.c. Primary ++++	Colon Bacillus	2.0 c.c. No Effect
			5.0 c.c. No Effect
	↓ Eye: Colon Bacillus, Enterococcus		
Right Tonsil	2.0 c.c. Primary ++++	Colon Bacillus	2.0 c.c. ++
			5.0 c.c. ++++
		α Strep. (7-7)	2.0 c.c. No Effect
	5.0 c.c. Primary ++++		5.0 c.c. No Effect
	↓ Both rabbits had hemorrhages in eyes and nose		

Illustrating the production of iritis in rabbits by the injection of both 2.0 c.c. and 5.0 c.c. of primary cultures from the tonsils of a patient with acute iritis. This is of interest because both series gave similar results; namely, the production of iritis by colon bacilli but not by streptococci.

Both 2.0 c.c. and 5.0 c.c. of the primary cultures from the first cases studied produced iritis in rabbits (chart 1). For the next few cases only 2.0 c.c. of the primary cultures was used. The results were negative, even though the patients from whom the cultures were obtained had pronounced ocular symptoms. An additional 2.0 c.c. or 3.0 c.c. of the same primary cultures was therefore injected into the same rabbits within 24 hours. Positive results were obtained in a number of instances (chart 2).

As a result of these findings, the initial dose was increased to 5.0 c.c. The increased dose produced satisfactory results with throat cultures but death occurred rapidly in the majority of rabbits injected with nasal cultures. Furth-

*The in-vitro toxicity tests referred to in this paper are listed in the following order: for staphylococci, hemolysis and coagulase tests[18] and violet agar reaction;[19] for streptococci, resistance to sodium bicarbonate and hexylresorcinol.[21] In the staphylococcal reactions, toxicity is graded from negative to 4+. In the streptococcal tests, toxicity is graded from negative to 8+.

er study led to the belief that death was due to the colon bacilli and toxic staphylococci often recovered from the nasal membranes, and to the fact that these organisms grew more luxuriantly than streptococci, which usually predominate in the throat. It was then decided to use as an initial dose 5.0 c.c. for throat cultures and 3.0 c.c. for nasal cultures, although the optimum dose for each case varies and cannot be predetermined. In the case of nasal cultures, when an injection of 3.0 c.c. did not result in death or ocular disturbance within 12 to 24 hours, an additional 2.0 c.c. or 3.0 c.c. was usually given.

tures showed negative results and the rabbits survived 48 hours, no other rabbits were inoculated. Conjunctivitis was ignored except when it was marked. With one exception, whenever a primary culture produced iritis in rabbits, one or more of the purified strains also produced iritis in rabbits. Iritis was produced with pure cultures of streptococci, enterococci, nonlactose fermenters (degraded colon bacilli?), colon bacilli, and staphylococci.

Chart 3 illustrates a case of hemorrhagic retinitis in which the primary cultures did not reveal significant information, but in which four of the five

Chart 2

CHRONIC UVEITIS O.S.

Left Tonsil: 2.0 c.c. Primary — No Effect; + 2.0 c.c. Primary — ++++ (Died 5 Days)

↓ α Strep. 5-5; α Strep. 8-8; γ Strep. 5-5 ← Compare → Eye — γ Strep. 5-5

Right Tonsil: 2.0 c.c. Primary — No Effect; + 2.0 c.c. Primary — +++

Illustrating an instance in which 2.0 c.c. of primary cultures from a patient with chronic uveitis ailed to produce iritis in rabbits, whereas an additional 2.0 c.c. produced iritis.

The rabbits were observed at intervals commencing six hours after inoculation. Detailed examination was made after 12 to 15 hours and, if no ocular lesions were noted, again after 24 to 48 hours. The animals were then discarded. Recent observations show that iritis may appear as early as one to three hours after inoculation and subside within a few hours. In other instances, a definite iritis may not appear until the end of 10 to 12 hours. This indicates the necessity of early and more frequent observation.

When a primary culture produced a pathologic effect in the rabbit's eyes, all the purified brain-heart-infusion cultures of the isolated organisms were inoculated into rabbits to determine, if possible, which strain or strains produced the original eye lesion. This was also done when the rabbits died too early for the appearance of eye symptoms or when they died during the night. Ordinarily, if the primary cul-

strains of streptococci isolated from the throat culture produced iritis in rabbits. This demonstrates the value of testing individual strains.

Chart 4 illustrates the findings in a case of sclerokeratitis, possibly tuberculous, in which the primary cultures killed rabbits overnight but all the purified strains of streptococci produced iritis in rabbits.

Chart 5 illustrates the production of iritis in rabbits by the intravenous injection of a pure culture of enterococcus obtained from the left nostril of a patient with recurrent uveitis.

Chart 6 illustrates a case of recurrent iritis and episcleritis in which iritis was produced in rabbits by a nonlactose fermenter (possibly a degenerate strain of colon bacillus) isolated from the right nostril.

Chart 1 illustrates a case of acute iritis in which alpha streptococci and colon bacilli were isolated from the primary tonsil cultures. The colon bacilli

Chart 3

HEMORRHAGIC RETINITIS

Left Nostril	5.0 c.c. Primary — Died	α Strep. (5-5)	5.0 c.c. — No Effect 5.0 c.c. — No Effect
Right Nostril	5.0 c.c. Primary — No Effect		
Throat	5.0 c.c. Primary — Died	γ Strep. (5-5)	5.0 c.c. ++++
		α Strep. (3-3)	5.0 c.c. ++++
		α Strep. (8-8)	5.0 c.c. ++++
		α Strep. (8-8)	5.0 c.c. Died 1.0 c.c. ++++
		α Strep. (7-7)	5.0 c.c. Died 1.0 c.c. No Effect + 2.0 c.c. No Effect

Illustrating a case of hemorrhagic retinitis in which the primary cultures did not reveal significant information, but in which 4 of 5 strains of streptococci isolated from the throat culture produced iritis in rabbits.

Chart 4

SCLEROKERATITIS (T.B.?)

Left Nostril	5.0 c.c. Primary — Died Overnight		
Right Nostril	5.0 c.c. Primary — Died Overnight		
Throat	4.0 c.c. Primary — Died Overnight	β Strep.	5.0 c.c. +++
		γ Strep. (0-0)	5.0 c.c. +++
		α Strep. (7-7)	5.0 c.c. ++++
		α Strep. (5-4)	5.0 c.c. ++++
		α Strep.	5.0 c.c. +++ + 3.0 c.c. +++
		Staph. aur. (4-4-3)	1.0 c.c. Died Overnight

Illustrating the findings in a case of sclerokeratitis, possibly tuberculous, in which the primary cultures killed rabbits overnight but all the purified strains of streptococci produced iritis in rabbits.

Chart 5

RECURRENT UVEITIS

Left Nostril	2.0 c.c. Primary — No Effect + 3.0 c.c. Primary — ++++	Enterococcus 5.0 c.c. ++++ Colon Bacilli S. albus 0-0-0 α Strep. 5-5 α Strep. 7-7	↓ Eye
Right Nostril	3.0 c.c. Primary — No Effect + 2.5 c.c. Primary — ++++	Friedländer Bac.	5.0 c.c. Died 2.5 c.c. Died 1.0 c.c. Died
Throat	2.0 c.c. Primary — No Effect + 3.0 c.c. Primary — No Effect		

Illustrating the production of iritis in rabbits by the intravenous injection of a pure culture of enterococcus obtained from the left nostril of a patient with recurrent uveitis.

produced iritis in rabbits while the streptococci failed to produce iritis.

Chart 7 illustrates a case of suspected chronic tuberculosis of the choroid in which *Staphylococcus aureus* from the left and right nostrils produced iritis in rabbits with primary cultures but failed to do so after subculture.

In the earlier experimental work, staphylococci produced eye disease only with the primary cultures, as shown in chart 7. Apparently the power to produce iritis was often lost before the subculture could be injected because, when it did not kill the rabbits, the eyes remained normal. Therefore, the inoculation of purified strains of staphylococci was discontinued temporarily. On resuming the testing of purified strains, iritis was produced in several instances when only 1.0 c.c. of the culture was used.

Control experiments

Control cultures were obtained from apparently healthy persons having no obvious ocular infection. Five series of cultures were from laboratory assistants and three were from children. The remainder were from patients with chronic diseases such as arthritis, thyrotoxicosis, and so on, but with no eye disease. The findings were similar to those in patients with inflammatory eye diseases, iritis being produced by cultures of streptococci, Friedländer bacilli, staphylococci and colon bacilli, although the frequency of positive results was not quite so high.

Chart 8 illustrates a control case (laboratory assistant) in which the primary throat culture and two of the five strains of streptococci isolated from it produced iritis in rabbits.

Chart 9 illustrates a control case (laboratory assistant) in which iritis was produced in rabbits by a strain of Friedländer bacillus isolated from the left nasal culture, by a strain of staphylococcus isolated from the right nasal culture, and by a strain of streptococcus isolated from the throat culture.

Chart 10 illustrates a control case (laboratory assistant) in which a strain of colon bacillus isolated from the primary right nasal culture produced iritis in a rabbit. This is an instance in which

Chart 6

RECURRENT IRITIS, EPISCLERITIS

Left Nostril	5.0 c.c. Primary — Died	
Right Nostril	5.0 c.c. Primary — Died	Nonlact. fermenter 2.0 c.c. ++++
Throat	5.0 c.c. Primary — No Effect + 2.0 c.c. Primary — No Effect	

Illustrating a case of recurrent iritis and episcleritis in which iritis was produced in rabbits by a nonlactose fermenter (possibly a degenerate strain of colon bacillus) isolated from the right nostril.

Chart 7

OLD MILIARY TUBERCULOSIS OF CHOROID

Left Nostril	5.0 c.c. Primary ++++	Staph. aureus (2-3-3)	1.0 c.c. Negative
Right Nostril	5.0 c.c. Primary +++	Staph. aureus (2-3-3)	
Throat	5.0 c.c. Negative		

Illustrating the findings in a case of suspected chronic tuberculosis of the choroid, in which Staphylococcus aureus from the left and right nostrils produced iritis in rabbits with primary cultures but failed to produce iritis after subculture.

Staphylococcus albus produced iritis in primary culture but not in subculture.

Chart 11 illustrates a control case (rheumatoid arthritis) in which all the primary cultures from the throat and from the left and right nostrils killed mals in which eye lesions had been produced. Two cultures were overgrown by "spreaders," six yielded a number of different organisms, predominantly enterococci and colon bacilli, and only one yielded an organism similar to that in-

Chart 8

CONTROL CASE A.C.W.

Left Nostril	3.0 c.c. Primary — Died 1 Day	Staph. albus (4-3-4)	2.0 c.c. Died 12 hrs. 1.0 c.c. No Effect 0.5 c.c. No Effect
Right Nostril	3.0 c.c. Primary — Died 1 Day		
Throat	5.0 c.c. Primary — ++++	α Strep. (7-7)	5.0 c.c. +++
		α Strep. (8-8)	5.0 c.c. No Effect
		α Strep. (0-0)	5.0 c.c. ++++
		α Strep. (4-4)	5.0 c.c. No Effect
		α Strep. (6-6)	5.0 c.c. No Effect

Illustrating the findings in a control case (laboratory assistant) in which the primary throat cultures and 2 of 5 strains of streptococci isolated from it produced iritis in rabbits.

rabbits overnight but in which none of the organisms isolated from these cultures produced iritis in rabbits.

Method of culturing eyes

In the early experiments, cultures of the eyes were made in nine of the animals jected intravenously. The method of obtaining the cultures may have been at fault. The eye was enucleated as soon as possible after death, placed in 50-percent alcohol for 15 minutes, and drained. It was then dropped into brain-heart infusion and cut. By the following

Chart 9

CONTROL CASE E.L.N.

Left Nostril	3.0 c.c. Primary — Died 12 hrs.	Friedländer Bac.	2.0 c.c. +++
Right Nostril	3.0 c.c. Primary — +++	Staph. albus (3-4-3)	3.0 c.c. ++
		α Strep. (5-5)	5.0 c.c. No Effect
		α Strep. (8-8)	5.0 c.c. No Effect
Throat	5.0 c.c. Primary — Died 12 hrs.	α Strep. (7-7)	5.0 c.c. No Effect
		α Strep. (6-6)	5.0 c.c. No Effect
		γ Strep. (0-0)	5.0 c.c. No Effect
		α Strep. (4-4)	5.0 c.c. ++++
		α Enterococcus	5.0 c.c. No Effect

Illustrating the findings in a control case (laboratory assistant) in which iritis was produced in rabbits by a strain of Friedländer bacillus isolated from the left nasal culture, by a strain of staphylococcus isolated from the right nasal culture, and by a strain of streptococcus isolated from the throat culture.

method, which is now employed, no "spreaders" have appeared on the plates. The animal is anesthetized while the inflammation is at its height, the conjunctiva is irrigated with 1 : 200 Metaphen solution, a 27-gauge needle attached to a tuberculin syringe is plunged through the corneoscleral margin into the aqueous and all the fluid is aspirated. The possibility of contamination is thus reduced and, because the animal is still alive, the likelihood of obtaining live pathogenic organisms free from postmortem invaders is increased. Four eyes have been cultured by this latter method and two organisms similar to those injected intravenously (streptococcus and *Staphylococcus aureus*) have been recovered. When an organism similar to that injected intravenously was recovered from the aqueous of the rabbit's eyes, the organism isolated from the eye produced iritis in other rabbits. When organisms different from those injected intravenously were recovered from the aqueous they did not produce iritis in other rabbits. Eye cultures from six normal rabbits were negative.

Seventy percent of the iritis-producing strains gave positive toxicity tests by the in-vitro methods, while 60 percent of the strains which did not produce iritis also gave positive in-vitro toxicity tests. Thus, the proportion of toxic strains (as judged by in-vitro tests) among those which produced iritis and those which did not produce iritis was similar (chart 12).

Chart 10

CONTROL CASE A.E.D.

Left Nostril	3.0 c.c. Primary ++++	Staph. albus (0-4-3)	2.0 c.c. Negative
Right Nostril	3.0 c.c. Primary — Died 12 hrs.	Colon Bacillus	2.0 c.c.++++
Throat	5.0 c.c. Primary — Negative		

Illustrating the findings in a control case (laboratory assistant) in which a strain of colon bacillus isolated from the right nasal culture produced iritis in a rabbit. This also illustrates the production of iritis by a primary nasal culture containing only Staphylococcus albus but the failure to produce iritis with the subculture.

Chart 11

CONTROL—RHEUMATOID ARTHRITIS

Left Nostril	5.0 c.c. Primary — Died Overnight		
Right Nostril	5.0 c.c. Primary — Died Overnight		
Throat	5.0 c.c. Primary — Died Overnight	β Strep. (7-7)	5.0 c.c. No Effect
		α Strep. (3-3)	5.0 c.c. No Effect
		α Strep. (8-8)	5.0 c.c. No Effect
		α Strep. (7-7)	5.0 c.c. No Effect
		Nonl. ferm.	5.0 c.c. No Effect

Illustrating the findings in a control case (rheumatoid arthritis) in which all the primary cultures from the throat and from both nostrils killed rabbits overnight, and none of the purified organisms from these cultures produced iritis in rabbits.

Discussion and comparison of our experimental results with those of other investigators

The subject of the production of iritis in rabbits by various microörganisms is complex. It is further complicated by the use of various methods by different

investigators. For example, Zanettin[3] and Brown[22] endeavored to enhance the iritis-producing power of organisms by growing them in association with uveal tissue but reached opposite conclusions. Maestro[2] tried to produce oculotropic properties in streptococci by passage through normal rabbits' eyes. Cusumano[6] sought this effect by numerous passages of *Streptococcus viridans* and *Staphylococcus aureus* from eye to eye. He stressed the importance of using brain-broth medium. deAndrade[8] tried to produce ocular sensitivity to tuberculous infection by trauma. Alagna and Tallo[23] attempted to demonstrate elective localization by culture of various organs after intravenous injection of bacteria. Finally, Brown[22] endeavored to obtain a higher percentage of positive results by injection of the cultures into the carotid artery.

Various specific microörganisms, such as *Treponema pallidum*[24] and *Mycobacterium tuberculosis*[25] are believed to have been isolated from the eye in disease.

Investigators have produced iritis in rabbits by injection of streptococci,[1, 12, 13, 14, 22] *Staphylococcus aureus*,[3, 6, 22] *Bacillus subtilis*,[22] and pneumococci.[1] We obtained positive results with *Staphylococcus aureus, Staphylococcus albus,* streptococci (alpha, beta, and gamma types), enterococci, colon bacilli degenerate colon bacilli, and Friedländer bacilli with about equal frequency.

Rosenow and Nickel[1] stated that the usual tests for virulence, although useful for the determination of pathogenicity of streptococci, do not suffice to measure peculiar or specific effects, especially of those strains having a low general virulence. In this connection, we noted that there was no correlation between the ability of toxic and nontoxic organisms (determined by in-vitro tests) to produce iritis. In many cases, an organism which was highly toxic according to these tests did not produce iritis, while in other cases a nontoxic strain produced violent iritis. Iritis was produced by alpha, beta, and gamma types of streptococci, although none of them were exotoxic. Rosenow and Nickel[1] stressed the importance of using freshly isolated strains because some strains rapidly lose their localizing power. Our observations substantiate this, especially for staphylococci.

The fact that many observers who have made contributions to the subject of the experimental production of infectious eye lesions drew widely different conclusions, suggests that there is much to be learned. Because the methods used have not been uniform, it is impossible to compare the results satisfactorily.

Chart 12

RELATION BETWEEN IRITIS-PRODUCING POWER AND TOXICITY OF STAPHYLOCOCCI AND STREPTOCOCCI

Strains which Produced Iritis (37)	Toxic	70%
	Intermediate	11%
	Nontoxic	19%
Strains which did not Produce Iritis (56)	Toxic	60%
	Intermediate	13%
	Nontoxic	27%

Comparison of toxicity (as determined by in-vitro tests) of strains of streptococci and staphylococci which produced iritis in rabbits with the toxicity of those strains which failed to produce iritis.

Summary and conclusions

Iritis was produced in rabbits by the intravenous injection of either primary or purified cultures from 19 of 21 patients with acute or chronic eye diseases, and in 11 of 14 controls (laboratory assistants, healthy children and patients with arthritis and thyrotoxicosis).

Positive results were obtained with various microörganisms as follows: streptococci (alpha, beta, and gamma types), staphylococci (albus and aureus), colon bacilli, nonlactose fermenters, enterococci, and Friedländer bacil-

li. Of the 51 primary cultures from patients with eye disease, 25.5 percent produced iritis in rabbits and 39 percent caused death of the rabbits before examination or too early for the production of eye symptoms. Of the 35 primary cultures from the control group, 26 percent produced iritis and 60 percent caused death of the rabbits before iritis was observed. The high mortality of the rabbits injected with primary nasal cultures accounts for the large number of undetermined results.

Iritis was produced by 44 percent of 61 purified strains of streptococci from patients with eye disease as compared with 29 percent of 69 strains from persons in the control group.

Of the other organisms from patients with eye disease, 36 percent of the 22 purified strains of staphylococci, members of the colon group, and enterococci produced iritis. The results were undetermined in 18 percent. In the control group, 41 percent of the strains of staphylococci, members of the colon group, and Friedländer bacilli produced iritis. The results were undetermined in 25 percent.

Of the total of 134 cultures from patients with eye disease, 36 percent produced iritis while 17.9 percent were undetermined. Of the total of 116 cultures from persons in the control group, 29.2 percent produced iritis in rabbits, while 21.5 percent were undetermined.

Toxicity, as measured by in-vitro tests, did not seem to be related to the iritis-producing power of streptococci and staphylococci. Seventy percent of the organisms which produced iritis gave positive toxicity reactions, whereas 60 percent of the strains which did not produce iritis also gave positive toxicity reactions.

It is concluded that, while iritis is produced in rabbit's eyes by various cultures of bacteria, this property is not characteristic of any one bacterial genus, neither is it distinctly a property of cultures from patients with inflammatory eye diseases.

We wish to express our sincere appreciation to Dr. James M. Evans and Miss Adele Mayo for their coöperation in this study.

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Chart 13

SUMMARY OF RESULTS IN THE PRODUCTION OF IRITIS BY THE INTRAVENOUS INJECTION OF PRIMARY CULTURES AND PURE CULTURES ISOLATED FROM THEM.

Type of Culture	Patients with Eye Lesions (21)			Control Cases (14)		
	Number Tested	Percent Positive	Percent Undetermined*	Number Tested	Percent Positive	Percent Undetermined*
Primary (mixed)	51	25.5	39	35	26	60
Streptococci	61	44	0	69	29	3
Staphylococci	6	17	50	8	37.5	12.5
Colon bacilli	4	75	25	1	100	0
Nonlact. fermenter	3	67	0	1	0	100
Enterococci	7	28.5	0	0	0	0
G. tetragena	1	0	0	0	0	0
Pneumococci	1	0	0	1	0	100
Friedländer bacilli	0			1	100	0
Total	134	36	17.9	116	29.2	21.5

The cultures were obtained from the nose, throat, and other foci of patients with inflammatory eye disease and from controls (laboratory assistants, healthy children, and patients with arthritis and thyrotoxicosis but without obvious eye symptoms).

* Died without examination.

References

[1] Rosenow, E. C., and Nickel, A. C. Elective localization in determining etiology of chronic uveitis. Amer. Jour. Ophth., 1932, v. 15, p. 1.

[2] Maestro, T. Oculotropismo sperimentale degli streptococchi. Boll. d'ocul., 1935, v. 14, p. 1251.

[3] Zanettin, G. Localizzazione elettiva dello stafilococco nell'occhio (Contributo sperimentale alla questione delle infezioni focali). Ann. di ottal. e clin. ocul., 1933, v. 61, p. 20.

[4] ———. Infezioni focali e malattie oculari. Ann. di ottal. e clin. ocul., 1934, v. 62, pp. 588, 695, and 786.

[5] Blanc, G., and Martin, L. A. Iridocyclite expérimentale provoquée par virus typhique. Compt. rend. Acad. d. sc., 1935, v. 200, p. 865.

[6] Cusumano, A. Infezione focale e localizzazione secondaria nell'occhio (Contributo sperimentale sul tropismo elettivo batterico). Rassegna Ital. d'Ottal., 1935, v. 4. p. 46.

[7] Wherry, W. B., and King, C. Case illustrating local sensitization of eye to bacterial protein. Jour. Med., 1927, v. 8, p. 85.

[8] de Andrade, L. Experiments on the influence of injuries of the eye on localization of focal phenomena from tubercle bacilli introduced into the blood stream, and remarks on the question of sympathetic ophthalmia. Klin. M. f. Augenh., 1934, v. 92, p. 350.

[9] von Herrenschwand, F. Spirochaeten und Bacillus fusiformis bei akuter Konjunktivitis. Zeit. f. Augenh., 1927, v. 62, p. 370.

[10] Brown, A. L. Considerations underlying experimental production of uveitis. Amer. Jour. Ophth., 1932, v. 15, p. 19.

[11] ———. Chronic uveitis. Bacteriologic and immunologic considerations. Arch of Ophth., 1934, v. 12, p. 730.

[12] Irons, E. E., Brown, E. V. L., and Nadler, W. H. The localization of streptococci in the eye. A study of experimental iridocyclitis in rabbits. Jour. Infect. Dis., 1916, v. 18, p. 315.

[13] Meisser, J. G., and Gardner, B. S. Elective localization of bacteria isolated from infected teeth. Jour. Amer. Dent. Assoc., 1922, v. 9, p. 578.

[14] Haden, R. L. Elective localization in eye of bacteria from infected teeth. Arch. Int. Med., 1923, v. 32, p. 828.

[15] Billings, F. Focal infection. New York, Appleton-Century Co., 1916.

[16] Berens, C., Connolly, P. T., and Chapman, G. H. Focal infection in diseases of the eye. 1. Report of certain laboratory examinations. Brit. Jour. Ophth., 1934, v. 18, p. 463.

[17] Rawls, W. B., and Chapman, G. H. Experimental arthritis in rabbits. Comparison of the arthritis-producing ability of inagglutinable streptococci which resist the "bactericidal" action of fresh, diluted, defibrinated guinea pig blood and those which are agglutinable but sensitive to the "bactericidal" agent. Jour. Lab. and Clin. Med., 1935, v. 21, p. 49.

[18] Chapman, G. H., Berens, C., Peters, A., and Curcio, L. Coagulase and hemolysin tests as measures of the pathogenicity of staphylococci. Jour. Bact., 1934, v. 28, p. 343.

[19] Chapman, G. H., and Berens, C. Crystal violet agar as a differential medium for staphylococci. Jour. Bact., 1935, v. 29, p. 437.

[20] Chapman, G. H., and Rawls, W. B. Studies of streptococci I. Qualitative differences in resistance to various agents. Jour. Bact., 1936, v. 31, p. 323.

[21] Chapman, G. H., and Curcio, L. Studies of streptococci II. Quantitative differences in resistance to sodium bicarbonate and hexylresorcinol. Jour. Bact., 1936, v. 31, p. 333.

[22] Brown, A. L. Chronic uveitis. Bacteriologic and immunologic considerations. Trans. Sec. Ophth. Amer. Med. Assoc., 1934, p. 111.

[23] Alagna, G., and Tallo, F. Sulla diagnosi dei foci tonsillari e sul tropismo elettivo dei batteri in essi contenuti; Contributo clinico-sperimentale. Arch. Ital. di Otol. Rinol. e Laringol., 1935, v. 47, p. 112.

[24] Collins, E. T., and Mayou, M. S. Pathology and bacteriology of the eye. Ed. 2, Philadelphia, P. Blakiston's Son and Co., 1925, p. 557.

[25] Meller, J. Nachweis von Tuberkelbazillen bei Uveitis durch Kultur aus dem Gewebe des Augeninnern. Zeit. f. Augenh., 1932, v. 77, p. 1.

TOBACCO AMBLYOPIA; ALCOHOL AMBLYOPIA

Report of One Uncomplicated Case of Each Condition

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The syndrome often spoken of as "tobacco-alcohol amblyopia" in the United States is called "tobacco amblyopia" in Great Britain and "alcohol amblyopia" in France. The authors report one case of alcohol amblyopia in a person who never used tobacco and one case of tobacco amblyopia in a teetotaler. They feel that the amblyopia may be associated with the use of either substance. From the Eye Institute of the Columbia-Presbyterian Medical Center.

There has been a considerable difference of opinion regarding the relative importance of alcohol versus tobacco in that clinical entity often called tobacco-alcohol amblyopia. English writers refer to this condition as "tobacco amblyopia"; French oculists call it "alcohol amblyopia." Almost always, at least in this country, the disease apparently occurs in patients who use both alcohol and tobacco. Therefore, we thought it might be of interest to report one case of alcohol amblyopia in a patient who had never used tobacco in any form and one case of tobacco amblyopia in a patient who was a teetotaler.

At "a special meeting for the collection of facts as to toxic amblyopia" held by the Ophthalmological Society of the United Kingdom[1] in 1886 it was decided that this entity was due to tobacco. No case caused by alcohol was found. Report of tobacco amblyopia in teetotalers was made by Nettleship,[1] Morton,[1] Griffith,[1] Berry,[1] and Shears.[1] Connor[2] described two cases in patients who were total abstainers from alcohol in any form and reviewed 27 similar cases in the literature. Powers[3] reported a case of tobacco amblyopia in a 19-year-old boy who was a teetotaler. Creveling[4] reported a similar case in a 23-year-old youth. Usher and Elderton[5] in a study of 1,100 cases stated that 112 of the patients were total abstainers. from alcohol. Certainly there seem to be on record numerous authentic cases of tobacco amblyopia in patients who have consumed no alcohol. Traquair[6] says that the term tobacco-alcohol amblyopia is incorrect in so far as Great Britain is concerned and that any influence that alcohol may have is merely that of a factor in depressing the general health.

On the other hand, the French oculist Bussy[7] claimed that tobacco plays no role in this condition, that the term nicotine-alcohol amblyopia should be abandoned, that it should be called alcohol amblyopia. Daguenet[8] and Rollet,[9] other French authors, also write only about "alcohol" amblyopia.

Report of Cases

Case 1. A 28-year-old negro girl was seen at the Vanderbilt Eye Clinic where she complained of poor vision which had been present for several months. She said she saw better in dull light than in bright light. A strong alcoholic odor surrounded her; detailed questioning finally revealed that she was a heavy drinker but had never smoked a cigarette. She lived in Harlem and daily started drinking in the afternoon at one of the bars or night clubs there and would continue to go from one such place to another until the following morning. This had been her daily routine for over one year.

Eye examination: Vision in each eye was 20/200, unimproved, the discs had a moderate temporal pallor, and the fields showed a centrocaecal scotoma (Fig 1); otherwise the examination revealed nothing abnormal. The neurological examination was negative except for a marked tremor of the tongue and fingers. The blood Wassermann was negative. Gastric analysis showed a complete absence of free or combined hydrochloric acid and the medical consultant made a diagnosis of alcoholic gastritis. The patient had a mild macrocytic type of anemia with a red blood

count of 3,400,000 and a hemoglobin of 80 percent. X-ray films of the skull, sinuses, optic canals, and teeth were negative.

The patient had apparently been on a poorly balanced diet but had not lost weight. Since it has been estimated[10] that about 1,600 calories per day may be obtained from alcohol, it is easy to understand why the caloric intake of most chronic alcoholics is adequate although the diet may be very inadequate

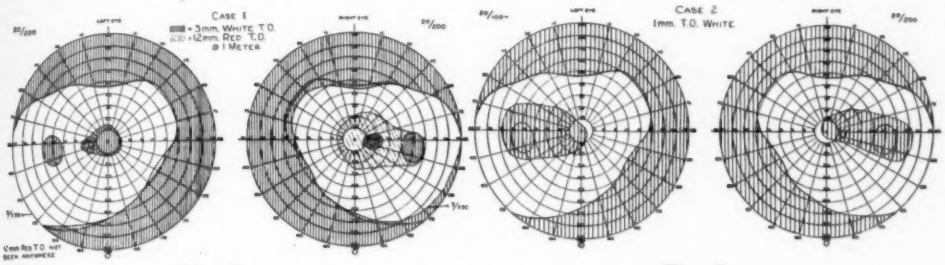

Fig. 1 Fig. 3

Fig. 1 (Carroll and Franklin). Visual-field chart in case 1 (alcohol amblyopia).
Fig. 3 (Carroll and Franklin). Visual-field chart in case 2 (tobacco amblyopia).

in other respects. This patient probably consumed between one pint and one quart of whiskey daily. On every visit to the clinic she has vigorously denied having ever used tobacco in any form, and since no stigma is associated with cigarette smoking by women there seems no reason to question her veracity about this. It is most unlikely that a woman who would admit that she was a heavy drinker would deny that she occasionally smoked a cigarette if the latter were true.

For 20 months the patient has been seen at frequent intervals. Although advised to discontinue drinking she always, when seen in the Clinic, has a breath with an alcoholic odor. The vision improved to 20/70 in three months and has remained stationary since then. The discs now show very marked temporal pallor (fig. 2) consistent with, but not diagnostic of, partial atrophy of the papillomacular bundles. Progressive improvement in vision accompanied by an increase in the pallor of the discs is not uncommon in these cases.

Case 2. A ship captain, aged 59 years, was seen privately by one of us (C.R.F.) on January 2, 1936. He said that his vision had been gradually failing for eight months and that one month previously he began using a magnifying glass in order to read. He had smoked 12-15 cigars daily for several years but maintained that he never had taken alcohol in any form. At every subsequent visit he was encouraged to give a history of even slight alcoholic intake but he strongly denied this. The fact that he was a teetotaler was a

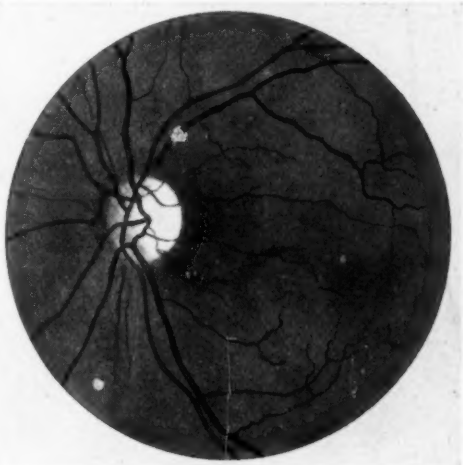

Fig. 2 (Carroll and Franklin). Fundus drawing in case 1 showing pallor of disc.

source of considerable pride to him. Eye examination revealed vision O.D. 20/200, O.S. 20/100—1, with glasses unimproved. In both eyes there were slight peripheral lens changes, moderate sclerosis of the retinal vessels, normal discs, and a centrocaecal scotoma as shown in figure 3. The vision gradually improved and in 2.5 months, just

before he moved from New York, his vision was O.D. 20/40, O.S. 20/40—with correction. The scotomas had greatly decreased in size.

Summary

Two cases are reported in patients who had similar types of scotomas. One was a case of tobacco amblyopia in a patient who was a total abstainer from alcohol in any form. The other was a case of alcohol amblyopia in a patient who had never used tobacco.

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References

[1] Trans. Ophth. Soc. U. Kingdom, 1887, v. 7, p. 36.
[2] Connor, L. Jour. Amer. Med. Assoc., 1890, v. 14, p. 217.
[3] Powers, G. H. Med. News, Dec. 4, 1886.
[4] Creveling, E. L. California Western Med., 1930, v. 32, p. 110.
[5] Usher, C. H., and Elderton, E. M. Ann. of Eugenics, 1927, v. 2, pts. 3 and 4, p. 245.
[6] Traquair, H. M. Edinburgh Med. Jour., 1935, v. 42, pt. 2, p. 153.
[7] Bussy, L. Le Jour. de Med. de Lyon, 1926, v. 7, p. 161.
[8] Daguenet. Ann. d'Ocul., 1869, v. 62, p. 136.
[9] Rollet. Le Jour. de Med. de Lyon, 1921, v. 29, p. 809.
[10] Jolliffe, N., Colbert, C. N., Joffe, P. M. Amer. Jour. Med. Sci., 1936, v. 191, p. 515.

RESULTS OF THE SURGERY OF GLAUCOMA

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A preoperative study of symptoms and the operative results judged by the vision, fields, and tension on 143 eyes are presented. Ninety-five eyes had vision of 0.1 or more before operation and 48 had less than that amount of vision. An analysis of those cases in which the fields were constricted to within a few degrees of the fixation point is made, and the results show that such a constriction should be no contraindication to surgical intervention. The findings corroborate the results of Eerola, whose survey of the literature showed that late infections from all sources were only 1.8 percent and that the fear of this condition is exaggerated. From the Division of Ophthalmology, University of Chicago, Dr. E. V. L. Brown, Director. Read before the Chicago Ophthalmological Society, March 16, 1936.

This presentation is an analysis of 100 cases (143 eyes) of primary glaucoma including seven cases in which there were retinal hemorrhages before operation and eight patients (13 eyes) with hydrophthalmos. No case with evidence of iridocyclitis is included. All but six eyes were operated on in private hospitals, either by Dr. E. V. L. Brown or by me, or at Billings Hospital by various members of the Senior staff and residents during the past eight years. Four eyes were operated on by Professor Holth in Oslo. These had been thoroughly studied before the patients went abroad and were followed for 10 to 20 years afterward. One patient (both eyes) was operated on by Drs. Parker and Slocum in Detroit.

Observations on the eyes in this series varied from 1 month to 20 years.

For	3 months or less there were	24 eyes
	6 months or less there were	7 eyes
	9 months or less there were	11 eyes
	12 months there were	20 eyes
	18 months there were	13 eyes
	2 years there were	22 eyes
	3 years there were	8 eyes
	4 years there were	13 eyes
	5 years there were	16 eyes
	9 years there were	2 eyes
	10 years there were	2 eyes
	14 years there were	2 eyes
	20 years there were	2 eyes

A family history of glaucoma was obtained in three cases. One patient's mother and sister had the disease; another had one brother and the third had one sister blind from glaucoma.

The ages ranged from 26 to 80 years,

the average being 59.2. There were 45 males aged from 26 to 74 with an average of 58.3 years, and 55 females from 26 to 80, with an average of 59.9 years.

There were 120 hyperopic eyes and 16 patients (23 eyes) were myopic. Among these patients were four eyes highly myopic (over 10 diopters).

Fifteen patients had heart disease, which varied from myocarditis and auricular fibrillation to angina pectoris.

There were four diabetic patients and 16 with nephritis, three with marked arterial hypertension. Two patients had positive Wassermann reactions. One had pernicious anemia. One patient had a cerebral sclerosis, one a goiter with B.M.R. +39 percent and another had had a thyroidectomy seven years before. One was allergic to potatoes. One had an endocrine disturbance, one was obese, and two had had hysterectomies. In seven eyes, there were retinal hemorrhages when first examined.

The vision recorded before operation was the best obtained while the eye was under the lowest tension possible with miotics and was often much better than the initial vision during an acute attack.

The fields were the largest obtained with the eye under a miotic and not those obtained during the acute stage.

Symptoms in order of frequency were blurring 50 times; pain 45; halos 40; redness 35; headache 33; nausea 14; and emesis 3.

In this series, there were 54 cases in which the Schiötz tonometer reading was higher than 50 mm. Hg, and in 50 of these, there were steamy corneae. In four the reading was higher than 50 mm. without this finding, and in four with less than 50 mm. of tension the corneae were steamy. All of this last group had tensions higher than 39 mm. Hg. All 54 eyes with a Schiötz reading of over 50 mm. had shallow anterior chambers. There were 14 additional eyes with shallow chambers, whose tension was less than 50 mm. Of these, three were under 30 mm. of pressure. No eyes with a Schiötz reading of 50 mm. or more had normal anterior chambers.

G. Salvati[1] called attention to the fact that the "middle pressure," that is, half the pulse pressure (mean of the difference between systolic and diastolic blood pressure), closely approximated the intraocular pressure in glaucoma. A survey of the material at hand revealed that of the 95 patients for whom the figures were available, 20 had a mean pulse pressure within 5 mm. of the Schiötz reading in eyes untreated with miotics and 26 were within this same range after the use of miotics. In 46 of the 95 cases, the pulse pressure was within 5 mm. of the intraocular pressure. In these same 95 cases, the average pulse pressure was 34 mm. The average of the Schiötz reading before miotics was 53 mm. and the average after miotics was 34 mm. In individual cases, the figures check more consistently for those with less than 50 mm. of intraocular pressure and patients without arterial hypertension.

The following operations were performed on the eyes in this series: Elliot trephining (three with complete iridectomy), 100; iridectomy, 13; Holth sclerectomy (one with complete iridectomy, 11; Lagrange sclerectomy, 12; cyclodialysis, 4; iridencleisis, 1; iridotasis, 1; vitreous fistula. 1; and enucleations, 9. Of this last group, four were seeing eyes before the first glaucoma operation.

The following table indicates the condition of the remaining eye in patients who underwent enucleations:

1 glc. with vision of 0.6 in remaining eye 18 months later
1 glc. with vision of 1.5 in remaining eye 14 years later
1 glc. with vision of 0.8 in remaining eye 2½ years later
1 glc. with vision of 0.8—3 in remaining eye 9 years later (iridectomy)
1 glc. with vision of 0.4 in remaining eye 9 years later (iridectomy)
1 glc. with vision of 1.2 in remaining eye 18 months later
3 glc. blind before operation

Complications of the surgical procedure in these cases were as follows:

Hemorrhage into anterior chamber at operation, 21; after operation, 19.

Buttonhole of the conjunctiva, 7; of these 2 developed iritis.

Prolapsed iris, 2.

Choroidal detachment, 20; 1 was operated on to replace the choroid and 1 other remained in a blind eye.

Iritis, 8.
Lenses injured at operation, 2.
Expulsive hemorrhage, 2 cases (table 1, no. 68; table 2, no. 38).
Detachment of Descemet's membrane, 1.
Vitreous prolapsed at operation 5 times. Of these, 3 eyes were enucleated for pain and inflammation (cases table 2, no. 8, 13, and 48).
Vitreous hemorrhage occurred after operation in 1 case. There were no late infections.

Aino Eerola[2] in a survey of the literature found only 100 late infections (1.8 percent in 5616 Elliot trephining operations and four cases, or 4 percent, in 954 iridencleisis operations. In Holth's clinic only one, or 0.3 percent occurred in 305 trephine operations and 0.7 percent in 137 iridencleisis operations. We have never seen an eye lost from a late infection following a fistulating operation for glaucoma. S. Kotljarewskaja[3] had no late infections. A. Del Barris[4] had as high as 5.5 percent of late infections in his cases.

Results in patients with better than 0.1 vision (table 1) before operation, as judged by the vision, fields, and tension, were as follows:

Of the 70 patients who underwent Elliot trephining operations, 48 showed no change or improvement of fields or vision and had normal tension.

Seven had poorer vision, but the fields and Schiötz readings were normal and unchanged. Of these, one had a postoperative iritis.

Ten patients had poorer vision, smaller fields but a normal tension. Of these one had diabetes and syphilis; one had 15 diopters of myopia; one had diabetes and nephritis; three had choroidal detachments. In one case the flap was buttonholed and iritis and cataract developed. Two had lenses injured at operation and one had a cataract operation with 12/10 vision but developed optic atrophy two years later.

Five patients had poorer fields and vision and the tension remained high. Of these one had myopia of 15 diopters; one had 0.3 vision for two years and then a cataract developed. One had nephritis and hypertension. One had a Lagrange operation in nine months, then iritis and shrinking of the globe. One had 0.6 vision for five years, then developed a cataract.

Following the one iridencleisis operation, the vision, fields, and tension improved.

In the case in which cyclodialysis was performed, the vision was poorer, but the fields and tension were normal while miotics were used. In three patients operated on by the Lagrange method, the vision, fields, and tension were better or unchanged.

Simple iridectomy was performed in six cases in which the vision, fields, and tension were better or unchanged. In two others, there was improvement in one for five months, then blindness from a cataract; in the other further surgery was required with resulting vision of 3/200.

In the eight cases in which there were Holth operations, the vision and fields were improved or unchanged and the tension remained normal. Of the patients in table 1, 13 required miotics to maintain normal tension while 70 did not (three eyes in this group were enucleated).

Field changes

Arcuate scotomata were found in 10 cases. One remained after operation and nine disappeared after surgical intervention. In one case, an arcuate scotoma first appeared after operation.

Reduction of the fields to within 8 degrees of the fixation point was found in 48 cases. There were six cases in which there was reduction to 8 degrees from the point of fixation. None of these showed any further loss following operation. In fifteen cases fields were reduced to 5 degrees from the fixation point. In four of these there was some loss in the central field. One patient with a reduction to within 3 degrees had a visual loss from 0.1 to perception of light. She had 15 diopters of myopia and the operation was complicated by a vitreous prolapse. A second patient with a like restriction to within three degrees of fixation lost vision from 0.2—1 to finger counting at 8 inches. This patient had 14 diopters of myopia. A third such patient (reduction to within 3 degrees of fixation) had a visual loss from 0.3 to perception of light in two years. The vision was 0.3 for two years. A cataract was removed,

a choroidal detachment occurred, and the final vision as recorded was obtained four months after the cataract extraction. The fourth patient with loss of field had vision of 0.2—1 reduced to 3/200 after a cataract extraction and choroidal detachment.

There were 10 patients whose fields were within 2 degrees of fixation. One had a further constriction of the fields. The vision was reduced from 0.4 to perception of light. The flap was buttonholed; iritis and cataract followed.

Of the 17 patients whose fields were within 1 degree of the fixation point, only two showed further loss. In one, vision dropped from 0.2 to perception of light. The lens was injured at operation. Choroidal detachment was present and a completely opaque lens was found three weeks later. In the other case, a patient with diabetes and syphilis, the vision dropped from 0.2—1 to 8/200.

Only seven of the 48 patients with central fields constricted to within 8 degrees of fixation had any further loss of fields or reduction of vision. All of these were desperate cases in which vision was poor and in four there were operative complications.

J. Etienne[5] states that constricted fields are no contraindication to operation. Our findings bear this out.

Our series is too small to permit the drawing of any conclusions as to the value of the various operative procedures for glaucoma except in the case of the Elliot trephining operation. In this instance, summarizing the cases (table 1) in which there were useful eyes before operation we find:

70 eyes were operated on by this method.
48, or 68.5 percent, had as good or better fields and vision with normal tension following operation.
7, or 10 percent, had poorer vision with normal fields and tension after operation.
10, or 14.2 percent, had poorer vision and fields with normal tension after surgery.
5, or 7.1 percent had poorer vision, fields, and high tension.
65, or 98.2 percent, had normal tension.

Comparing these findings with N. Philippow's[6] series of 54 cases after cyclodialysis, we find that he had 98.1 percent with normal and 1.9 percent with higher-than-normal tension. Vision improved in 88.4 percent and was unchanged in 15.4 percent. He found that the late results in his cases were poorer than after Elliot trephining operations.

S. Kotljarewskaja[3] performed 74 Elliot trephinings after which the tension was normal in 97 percent, and 84 percent of patients had improved vision in compensated cases. Of 31 cases followed one to four years, the vision was improved in 82 percent and unchanged in 18 percent. He had no late infections.

Joseph Etienne analyzed 43 cases of acute glaucoma with iridectomy and 144 cases of chronic glaucoma (89 trephining operations, 29 Lagrange, 7 Holth, 12 iridectomy, and 6 cyclodialysis). In 114 the tension remained normal (7 with second operation) and 25 patients continued to have hypertension. Five eyes in his series were enucleated.

A. Knapp[7] presented his results in 200 chronic-glaucoma cases, in 80 of which he had performed Elliot trephinings and in 95, Lagrange sclerectomies. Sixty of the 80 trephinings were successful with one operation and nine more with a second operation. Eighty-five Lagrange operations were successful with one operation and two more after a trephination. In 12 cases iridectomy was performed with good results in seven, and after trephination in an eighth case. The Lagrange operation was performed on selected patients with good fields.

There were 20 patients operated on for glaucoma while they still had useful vision in the eye undergoing operation, whose mate was not operated upon. Of these 15 had useful vision in the eye not operated upon. The poorest vision among these was 0.2 (39 months after operation). The remaining 14 patients had vision of from 0.4 to 1.5 for periods from 2 to 14 years. One had a tension of 30 mm. with vision of 1.0 and another 41 mm. with vision of 1.5. All other eyes had normal tension.

These findings make us sometimes hesitate before advising, certainly before urging, an operation on a compensated glaucomatous eye.

J. Etienne followed 34 eyes from two

Table 1

INITIAL VISION OF MORE THAN 0.1

No.	Sex	Age	B.P.	Hyperopic	Previous Oper.	Eye	Operation	D.V.	Pupil	Sch. High	Sch. Low	Degree of Fixation	Glc. in mate	Per. Field UN	UT	LN	LT
1	M	56	92/60	+	0	L	T	0.8	2.25	48.5	26.5	8	+	30	20	0	0
2	M	54	126/104	+	0	L	L	1.0	3.25	40	15.5		0	20	50	50	50
3	M	48	86/60	+	0	L	T	0.8−1	5.5	39	27.5	3	+	35	50	40	55
4	F	26	110/80	0	0	R	T	0.1	6.5	50	45	3	+	5	8	8	4
5	M	53	140/70	+	0	L	T	0.3−1	5.5	58	56	−	+	10	10	10	10
6	F	57	180/86	+	0	L	T	0.4−2	5	63	21.5	−	0	35	55	36	50
7	M	56	114/72	+	0	L	T	0.8	3.5	37.5	20	−	+	25	70	17	55
8	F	62	146/70	+	0	R	Ir	0.1	6	77	19	8	+	35	30	40	60
9	F	69	190/98	+	0	L	T	0.8−2	3	66	21.5	−	+	20	20	50	25
10	F	65	120/70	+	0	L	T	1.5−4	5	56	41.5	8	+	35	55	50	60
11	F	27	132/80	+	0	L	C	1.5−2	2.5	63	115	−	+	Complete			
12	F	65	140/84	+	0	R	T	0.5+2	6	59	20	5	+	5	35	10	35
13	F	58	188/112	+	0	R	T	0.8−3	4	60	17.5	−	+	45	60	45	75
14	F	58	188/112	+	0	L	T	1.2−4	4	35	15	−	+	45	75	40	78
15	F	75	176/90	0	0	L	T	0.8	4	39	25	+	+	0	40	0	40
16	F	38	110/76	+	0	L	T	0.4	1.5	40	22	−	+	35	50	40	75
17	F	72	108/66	+	0	R	T	0.5+2	1.75	48	22	3	+	30	55	48	70
18	F	74	166/96	?	0	L	T	0.8−3	3	56	31	1	+	35	65	50	75
19	M	65	?	+	0	R	T	0.8+3	3.25	42	17	2	+				
20	M	30	140/70	0	0	L	T	0.2−1	4	48	23	3	+				
21	F	79	184/80	+	0	L	T	0.1	5×6	39	23	5	+	30	40	5	10
22	M	50	152/104	+	0	R	T	1.0	2	26.5	18.5	−	+	30	75	45	75
23	M	65	158/90	+	0	L	T	1.0	1.75	36	22	2	+	5	50	40	70
24	M	41	130/78	0	0	R	T Ir	0.5−1	3.25 ×4	45	17	1	+	35	50	50	80
25	M	60	135/61	0	0	L	T	0.2	2.5	45	29	4	+	25	60	15	80
26	F	71	160/80	0	0	R	T	0.6+3	6.5	45	26.6	1	+	5	30	50	28
27	M	50	138/85	0	+ Ir	R	T	0.2	2	45	35	1	+	8	8	5	6
28	M	50	135/80	+	0	R	T	0.2+1	5.5	56	21.5	½	+	40	55	30	70
29	M	67	?	0	0	L	T	0.3	7	56	52	−	+	15	55	15	85
30	M	66	162/100	+	0	R	T	0.4−1	4	69	25	1	+	5	52	30	30
31	M	69	126/70	+	0	L	T	0.3+1	3	41.5	23	−	+	50	60	40	80
32	F	70	180/90	+	0	L	T Ir	0.8	3.5	31	23	−	0	50	45	40	70
33	F	70	170/90	+	0	R	T	0.5−2	5	42	35	5	+				
34	F	62	200/100	+	0	R	T	0.8−3	4	61	56	5	+	25	42	35	62
35	F	76	158/70	+	0	R	T	0.2	1.5	41	31.5	1	+	1	15	40	60
36	F	76	158/70	+	0	L	T	0.1	1.5	56	35.5	3	+	3	15	15	18
37	F	59	?	+	0	R	T	0.5+2	4.5	54	36	2	+	15	18	10	10
38	M	42	130/80	0	0	R	T	0.3+1	3	41	35	−	0				
39	M	62	?	?	0	L	T	1.0−2	2	61	48.5	−	0	20	22	10	12
40	F	77	106/58	+	0	R	T	0.1	4	42	30	1	+	5	8	35	10
41	M	64	115/70	+	0	R	L	0.5−2	—	50	20	1	+				
42	M	39	?	+	0	R	T	1.5−4	4	48	30.5	−	+	45	50	40	70
43	M	39	?	+	0	L	T	0.6+3	4	52	20	5	+	5	50	5	75
44	F	67	180/98	+	0	R	T	1.5−3	3	31	17.5	−	+	50	60	50	75
45	F	64	—	+	0	R	T	1.2+3	3	48.5	35.5	4	+	20	70	50	80
46	F	47	—	+	0	L	T	F. at 4′	4.5	72	60	−	+	45	70	45	80
47	F	61	200/120	+	0	R	H	1.0−1	2.75	39.5	39.5	−	+				

Table 1

INITIAL VISION OF MORE THAN 0.1

Central Field UN UT LN LT	Time in mos.	D.V.	Pupil	Schiötz	Miotic	Bleb	Per. Field UN UT LN LT	Central Field UN UT LN LT	Complications
B. 10 10 8 8 1.5 arcuate	22	0.6	4	16	0	+	45 45 10 50	B. 15 8 6 20	Sch. 90 Homat.
B. 1.5 arcuate	15	1.5−2	3	13.5	0	+	Full	B. Full	
B. 20 3 20 6 arcuate	4	0.8	5	11.5	0	+	No change	B. No change	Bro. glc.
B. 3 8 11 12	4	F. at 8′	5	22	0	0	10 5 10 5	B. 05 05 1.5 1.5	C.D. H. Myopia
	2½	F. 2′	4	13.5	0	+	No change	No change	C.D. Bl. Sugar 106
	1	0.8−3	5.5	14	0	+	No change	No change	BMR Decomp. +39° Heart. Albumen
B. 20 20 2 7	24	1.5−4	3	13	0	+	45 52 48 70	B. 20 20 20 8	Ang. Pectoris C.D.
B. 8 8 8 10	15	0.6−2	4.5 6.5	24	0	+	50 60 60 60	B. 18 10 5 10	Hyst. Obese 7 yrs. ago
B. Full	29	0.3	3.5 5	11	0	−	15 10 20 60	L 3 5 15 20	BMR −11%
B. 10 8 12 12	8	0.6−1	5	10	0	0	45 60 55 90	B. 35 35 38 30	
B. Sl. enlarged Blind spot	6	0.6	5	23	+	+	Full	B. Full	Det. Descemet
B. 5 10 8 9	4	0.6+2	4	29	0	+	50 70 60 90	B. .5 15 18 15	
B. 28 30 32 39	16	0.8−3	2.5	11.5	0	+		47 48 45 45	Disc swollen 9 days after
28 30 40 40	16	1.5−2	3	15	0	+		50 50 50 50	Cerebral aa Scl.
B. 5 30 0 32	12	0.3	3	25.5	0	+		B. 1 5 1 5	
B. 25 30 25 30	15	1.0	2	16	0	0	45 70 50 75	B. 20 25 20 25 R.glc.-Det. Ret.	WR 4+ (2) T
L 3 7 3 8 Arcuate	6	0.4+1	3	20	0	+		B. 45 35 35 15	
B. 25 25 1 9	8	0.6	4	18	0	+	35 50 40 80	L 5 3 1 1	2 (T) 11th day. Sch. 52
L 2 5 10 10	65	0.8+4	4.5	10	0	+		B. 2 11 41 48 Arcuate	C.D.
L 20 3 15 5	5	P of L	4.5	31		0		Vit. hem. after op. and 2 drain. attempts.	Myo. 15 D. Ret. hem.
20 25 5 5	60	P of L	3	20		+		0.5 2 yrs. after op.	Dense cataract
	72	0.8+1	2.25	23	+	+	40 60 40 75		Sch. same without miotic
L 2 3 8 8	14	0.8−3	3.5	26.6	0	−	5 50 35 65	L 3 3 4 20	C.D.
L 1 1 25 25	10	0.5	6	20		+	Unchanged	L Same	C.D. −4D. to −2.00 cyl.
L 4 25 15 25	46	0.2	4×5	23	0	?	20 60 10 68		
L 1 1 3 10	42	0.6	1.5	15	0		2 8 10 10	L 2 1 3 9	C 7/26/35
L 5 1 2 1	53	0.3	1.5	39	+			5 3 3 2	Lens opaque
L 2.5 2.5 0 0	70	0.1	—	18	0	−	45 60 30 85	40 2 1½ 1	0.6−3 for 5 yrs.
	19	0.2	5	15	0	+	25 55 30 75		
L 1 2 3 8	24	0.1	3.5	13	0	−	5 40 35 45	L 6 2 10 10	C.D.
L Blind spot 18×13 horiz.	57	0.2+1	2	26.6	+	0	Not taken	B. 10 12 8 10	
	37	0.3−1	3	15	0	+	35 40 42 45		Bl. sugar 2.54. Ret. hem. Cat.
L 15 20 5 9	22	0.3−1	—	18	0	+		L 6 8 6 7	C.D. Lens opacities
L 10 10 9 5	45	0.1	1.75	30		+	5 25 10 22	L 9 10 5 5	
L 1.5 3 3 4	18	P of L	—	15	0	+	Lenses opaque 3 wks. after oper.		C.D. Lens opaque
L 3 7 10 20	18	P of L	—	15	0	+	Lenses opaque 3 wks. after oper.		C.D. Lens opaque
L 4 5 2 4	15	0.5+1	—	12	0	+	5 5 8 8	L 6 5 5 4	
	26	F. at 2′	—	23	0	+			−5 D. L. Cat. and gl. =1.2
B. 20 25 20 12	20	0.5−2	3	23	0	+		B. 18 20 18 15	
1 4 2 5	33	0.2	3.5	15.5	0	+	5 5 32 60	L 1 1 10 20	Hyphema Lens opacities
L 1 5 1 5	14	0.3	2.5	18	0	−		L 1 4 1 6	Pernicious anemia
L 10 10 12 12	27	1.0+3	2.5	25	0	+	55 60 50 80	B. 28 41 39 35 arcuate below	2d op. in 26 mos.
	27	0.6−2	3	25	0	+	15 10 5 70		
L Full	13	P of L	4	20	0	+		R.L. Scl. 9th month	
L 4 10 5 10 arcuate	49	1.2	1.5	17.5	+	+	30 60 60 80	L 2 6 3 10	
	96	0.4	4	20.5	0	+	35 55 52 50		
L Full	17	1.0	2.75	17	0	+		L Blind spot 10×10	

Table 1 (continued)

INITIAL VISION OF MORE THAN 0.1

No.	Sex	Age	B.P.	Hyperopic	Previous Oper.	Eye	Operation	D.V.	Pupil	Sch. High	Sch. Low	Degree of Fixation	Glc. in mate	Per. Field UN	UT	LN	LT
48	F	35	165/105	+	0	R	Ir	0.5	5.5	47.5	18.5	–	+	40	55	40	70
49	M	69	—	0	0	R	T	0.6	4.5	—	27.5	6	+	10	65	50	75
50	M	69	—	0	0	L	T	0.3+1	4.5	—	36.5	2	+	2	15	20	50
51	F	57		+	0	R	Ir	F. at 4′	5	60	40	–	+	55	75	55	80
52	F	39	—	+	0	R	T	0.5−1	2.75	38	22	–	+	52	65	52	82
53	F	73	—	+	0	R	T	0.4+1	3	31	31	2	+	50	80	40	65
54	F	67	154/82	+	0	R	L	1.2	3.5	30	20	–	+	30	45	50	65
55	F	57	—	+	0	R	T	1.5	3.5	55	28.5	5	+	8	40	20	65
56	F	57	—	+	0	L	T	1.0−4	3.5	44	28.5	2	+	15	35	35	35
57	F	61	150/90	+	0	L	H	0.3	5	30.5	30.5	–	+	45	60	70	70
58	F	52	—	+	0	R	T	0.8	2	41	35	–	+	45	50	50	70
59	F	37	150/90	+	0	L	T	0.8−3	2	66	20	–	+	50	50	45	40
60	M	51		+	0	R	H	1.2	4	51.5	22.5	8	+	35	80	4	5
61	M	51	—	+	0	L	H	1.5−2	4	44	18	–	+	55	80	60	75
62	M	49	180/110	+	0	R	H	1.2	4	66	43	–	+	10	50	10	0
63	M	49	180/110	+	0	L	H	1.2−1	4	58	39	–	+	50	70	25	80
64	F	67	150/80	+	0	R	T	0.4−2	2	—	16	–	+	30 vertical	40	45 arcuate	70
65	M	73	—	+	0	R	Ir	0.2	5	35	35	–	+				
66	M	73	—	+	0	L	T	1.2−3	4.5	30	30	2	+	30	30	40	35
67	F	60	—	+	0	L	T	1.0−3	5	51.5	40	2	+				
68	F	54	—	+	0	R	Ir	0.3	1.75	62	44	–	+				
69	F	58	130/84	+	0	R	T	1.2	1.5	77	23	–	+	25	60	10	10
70	F	58	130/84	+	0	L	T	1.2	1.5	49	29	2	+	25	65	15	10
71	M	63	134/68	+	0	R	T	0.3	2.75	26	26	–	+	55	60	50	72
72	M	63	134/68	+	0	L	T	0.4	3.5 ×5	28	28	–	+	50	75	55	80
73	F	47	?	+	0	L	T	1.2	3.25	69	35	–	+	50	65	40	80
74	M	74	176/90	+	0	R	T	0.6+2	3	86	16	–	+	10	45	10	35
75	M	69	128/66	+	0	R	T	0.6−1	2.0	35	30	–	+	45	55	50	80
76	F	80	224/110	+	0	L	T	0.4−1	2.5	54	52	–	+	28	25	30	50
77	M	63	145/85	0	0	L	L	0.2	2.5	56	56	–	+	11	50	33	70
78	F	64	175/90	+	0	L	H	1.0	2.5	39	26.5	6	0	40	70	50	75
79	M	69	190/106	+	0	L	L	0.8	3	48	48	–	+	55	80	40	90
80	M	62	160/88	0	0	L	T	10/200	4	48	48	6	+	30	65	30	70
81	M	79	130/70	+	0	R	Ir	12/200	3.5	33	26.6	–	+	55	60	20	80
82	F	51	150/90	+	0	L	T	HM at 2	5	85	20	1	+	8	50	28	55
83	M	54	150/75	+	0	R	Ir	15/200	2.5	48	48		+				
84	F	80	224/110	+	0	R	T	0.2−1	2.5	52	52	5	+	5	10	5	45
85	M	71	170/80	+		R	Ir	0.4−2	1.5	56	33	–	+				
86	F	70	160/89	+	0	L	Ir	0.3	3.5	80	40	–	+	40	20	15	55
87	M	69		±	0	R	T	0.2+1	5	—	24	½	+				
88	F	67		+	0	R	T	0.1	4.5	—	39.5	2	+				
89	F	67		+	0	L	T	0.2	4.5	—	27.5	1	+				
90	M	50	120/70	+	T and Ir	L	T	0.4	2.5	40	22	1½	+	20	12	15	5
91	M	26		0	0	R	Ir	0.6	4	60	30		+	15	15	30	60
92	M	26		0	0	L	Ir	0.6	4	75	40		+	40	45	10	15
93	F	61	128/64	+	0	L	T	0.2−1	3.5	46	28	1	+	25	20	25	40
94	M	74	—	+	0	R	H	0.2−1	5	46.5	45	1	+	1	1	50	40
95	F	25	—	0	0	R	T	0.1	5	43	22	–	+	10	45	55	60

Table 1 (continued)

INITIAL VISION OF MORE THAN 0.1

Central Field UN UT LN LT	Time in mos.	D.V.	Pupil	Schiötz	Miotic	Bleb	Per. Field UN UT LN LT	Central Field UN UT LN LT	Complications
	37	0.8−2	4×6	17.5	0	0	50 40 50 70		
L 6 6 8 6	30	0.5	3.5	20	0	+	10 55 55 80	L Full Bl. spot 10×10	Intro. BE after op.
L 2 5 10 10	30	0.1	4	20	0	+	5 40 30 70	L 1 2 10 10	Lenses ++ clouded. Myopia R and L 8 D.
L Full 7×8° Blind spot	30	0.4	5	26.6		0	55 75 55 85	L No change	Lens clouding
L Full. Blind spot 10×10	20	0.5	2	13.5	0	+	Unchanged	L Unchanged	
L 10 2.5 2 2	51	P of L	2×5	16	0	+		Buttonholed flap	Postop. Iritis cataract
B. 22 35 25 25 arcuate	13	Nil		20	0	+	3 mos. later 50 65 50 85	Inf. began 10 days after op. shrinking	Enucleation in 13 mos.
L 5 5 8 8	60	1.5−2	3	20.5	0	+	20 65 30 50		
L 2 2 3 2	60	0.5+2	3	14.5	0	+	5 30 10 10	L 4 8 3 5	
	72	0.2	3	15	0	+	55 40 50 40		Lens opaque
	108	1.2	2	20	+	+	50 55 40 70	L Full field	
B. 20 16 15 20	48	1.0−3	2	14	+	+	50 65 60 80	B. Full Bl. spot 2×	
B. 10 10 8 7.5	124	0.8−3	2	17.5	0	+	In T field 70×50 seeing area	L 5 5 5 5	Op. by Holth
B. Full field	124	1.2	3	16	0	+	50 60 22 82	L 8 4 8 5	Oslo
	20	0.3−1	3.5	15.5	0	+	25 70 5 30		Op. by Holth
	20 yrs.	1.0−4	3.5	11	0	+	25 70 25 80		Oslo
L Bl. spot 11×14 below	45	0.2	3.5	20		+	50 45 45 60	No change	
	15	H.M. at 2′	—	22.5	0	0			Marked lens clouding
L 2 4 10 10 arcuate	15	0.8−3	—	13.5	0	+	35 40 40 45	L Bl. spot 1.5× arcuate above	C.D.
L 10 20 2 4	8	0.8+6	4	18	0	+		L 10 20 8 4	Diabetic
	4	Shrinking enucleation							Expulsive hem. of ch.
	37	0.8	3	11.5	0	+	8 50 10 10	B. 9 30 9 10	
B. 5 10 10 2	37	0.8+2	3	13	0	+	10 55 10 10	B. 3 12 6 8	L. cyclo. 1 yr. Reopen L and T 5 mos. later
B. 22 30 23 28	2						Enucleation in 40 days. Severe iritis S.O.?		WR ++. By mail 15 mos. O.K.
B. 38 40 42 45	2	0.8−4	4.5	20	0	+	Full	Full	
Full	17	1.0+1	4	20	0	+	55 65 50 80	Full	C.D.
	2	0.5−1	4.5	15	0	+	20 32 55 32		C.D. 2 mos.
B. 35 35 35 35	27	0.6+2	4.5	16.5	0	+	25 35 40 50	15 35 35 35	C.D. Repaired cat. ext.
O.K. Bl. spot 18×30 horiz.	2	0.2+1	2.5	10	+	0		B. 10 12 8 10	7. D. myopia myocarditis
	31	0.4	3	23	0	+		B. 9 8 9 9	
L 10 15 6 8	9	1.5−2	2.5	25.5	+	0	53 70 51 80	B. 15 30 30 30	
	26	1.0+1	3	13	0	+	55 45 50 65	L Full	Hypert. heart −4D.
L 9 10 5 6	3	0.6−2	3	6	0	+	30 65 30 70	L No change	
B. 42 42 10 12 arcuate	9	0.6−3	3.5	27	0	0	50 70 12 70	L 20 20 6 9	
L 1 1.5 3 10	41	0.4−2	4	11.5	+	+	8 40 30 65	L 1 1.5 10 10	
	8	0.5−2	4.5	29	0	0	15 65 35 5		Lens opacities
	24	3/200	2.5	26.5					C.D. Lens opacities
B. 18 25 11 35	9	3/200	3×6	28	+	0	Sallmann Cyclodi 2 mos. after Irid.	B. 10 22 12 30	Alb. Chr. Prostatic Healed Tb.
L 10 10 10 10 arcuate	60	H.M. at 5′	5	30.5	0	0	Cat. in 2 mos. 0.4 in 5 mos.	L 0 6 0 7	
L 1 10 .5 3	48	0.8−2	2.5	10	0	+		L 2 1 2 3	
L 4 3 2 5	25	0.1	—	12	0	+		L 1 1 1 1	Opacities
L 1 1 3 5	25	0.2−1	—	12	0	+		L 1 1 2 6	Opacities
L 10 10 2 1.5	5	0.4+1	—	20.5	0	+		L 10 35 2 3	
	10	0.4−2	5	47	+	0	25 35 20 60	L 3 2 10 10	Parker and Slocum '22
	51	0.3	6	31.5	+	0	60 36 8 30	L 9 9 2 1	Parker and Slocum '18
B. 1.5 18 12 18	28	8/200	15	20	+	+	10 20 10 22 Lagrange in 5 mos.	B. 5 .5 1 1	Diabetic Bl. sugar 133 WR+
L 1 2 8 20	3	0.1	5.5	13.5	0	+		L 1 2 8 10	Lens ++ opaque
B. 18 18 18 18	50	H.M.	4	18	0	+		B. Same in 2 yrs.	High myop. 14 D. Choroiditis WR neg.

Table 2

INITIAL VISION LESS THAN 0.1

No.	Sex	Age	B.P.	Hyperopic	Previous Oper.	Eye	Operation	D.V.*	Pupil	Sch. High	Sch. Low	Degree of Fixation	Glc. in mate	Per. Field UN UT LN LT
1	F	25	—	0	0	L	T	P of L	5	31	27.5	—	+	
						Ir								
2	F	60	—	+	0	R	C	Nil	5	51.5	51.5	—	+	
3	F	62	—	+	0	R	T	P of L	4	100	80	—	+	
4	F	52	—	+	0	L	T	8	2	44	35	—	+	
5	F	61	150/90	+	0	R	Ir	8/200	6	62	51.5	—	+	25 50 50 50
6	M	60	150/90	+	0	R	C	16/200	3	39	26	5	0	
7	F	57	—	+	0	L	Ir	2	6	40	40	—	+	
8	F	35	165/80	+	0	L	Ir	P of L	7.5	88	72	—	+	
9	F	59	—	+	0	L	T	H.M.	5	59.5	27	—	+	
10	F	47	—	+		R	H	Nil	5	85	85	—	+	RV = 0.2 (8 yr. before)
							Ir							
11	F	60	—	+	0	L	T	0.1	5	40	21.5	½	+	45 50 55 60
							Ir							
12	M	63	108/70	+	0	L	L	0.1	2.5	56	48	0	+	
13	M	68	153/75	+	C	L	T	H.M.	4	55	45	—	+	
14	M	69	145/90	+	0	R	It	2	4.5	52	39.5	—	0	
15	M	60	140/95	+	0	L	H	H.M.	2	63	50	—	+	40 60 45 55
								20						
16	F	74	180/90	+	0	R	L	Nil	4.5	75	69	—	+	
17	M	41	—	+	T	L	L	7	5	60	60	—	+	10 12 10 9
18	F	66	220/120	+	0	R	L	3	6	63	—	—	+	15 12 20 18
19	F	66	220/120	+	0	L	L	Nil	5.5	101	—	—	+	
20	F	59	—	+	2	R	VF	Nil	5	80	50	—	+	
21	F	59	—	+	0	L	T	2	5	75	52	1	+	5 05 05 05
22	M	65	—	+	0	L	T	3	3.25	42	17		+	
23	M	65	158/90	+	0	R	T	H.M.	1.75	36	22		+	
24	M	75	148/80	+	0	R	T	7/200	3	31	13		+	
25	M	75	148/80	+	0	L	T	4/200	3	31	13		+	
26	M	60	135/68	0	G	R	T	2	2.5	45	29		+	
					and									
					C									
27	M	50	135/68	+		L	T	5/200	5.5	51	23		+	
28	M	67	—	0	Ir	R	T	Nil	6.5	52	52		+	
29	M	69	126/70	+	0	R	T	H.M.	3.5	56	15.5		+	
30	F	70	170/90	+	0	L	T	2	4	42	35.5		+	
31	F	62	200/100	+	0	L	L	P of L	4	101	101		+	
32	F	74	150/80	+	G	L	T	3	5.5	56	35		+	
					and									
					C									
33	M	79	130/70	+	0	L	T	3/200	3.5	56	26.6		+	
34	M	64	115/70	+	0	L	T	2	—	50	20		+	
35	F	67	180/98	+	0	L	T	Nil	6	86	86		+	
36	F	47	—	+	0	R	T	Nil	2.75	77	48.5		+	
37	M	68	154/100	+	0	R	T	P of L	4.5	56	20		+	
38	F	76	180/90	+	0	R	H	P of L	4.5	120	80		0	
39	M	48	86/60	+	0	R	T	6	5.5	36	27.5		+	
40	M	53	140/70	0	0	R	T	P of L	5.5	61	27.5		+	
41	F	60	190/94	+	0	R	T	2	5	66	28		+	
42	F	62	190/98	+	0	L	Ir	Nil	2.5	94	63		+	
43	M	59	194/104	+	0	R	L	Nil	6.5	86	54		0	
44	F	72	108/60	+	0	L	T	7/200	2	48	22		+	
45	F	44	250/180	+	0	L	C	5	3	35	20		0	
46	F	59	—	0	0	L	T	1	5	75	52		+	
47	M	69	—	+	0	R	T	2	5	—	33.5		+	
48	F	69	—	+	0	L	T	8	1.5	39	27.5		+	

Table 2

INITIAL VISION LESS THAN 0.1

Central Field UN UT LN LT	Time in mos.	D.V.	Pupil	Schiötz	Miotic	Bleb	Per. Field UN UT LN LT / Central Field UN UT LN LT	Complications
	50	P of L	6.5	16	0	+		Lenses opaque
	10	Nil	2.25	18	0	0		Diabetic
	8	Nil	4	60	+	0	Photo Lac. Red. — Enucleation	Thyroidectomy 1928
	108	P of L	2	40	+	0		
	14	P of L	6.5	25	0	0	4 yrs. RV = 0.1 50 60 55 85	Lens opaque
B. 25 30 5 20 arcuate	yrs. 26	P of L	5	23	0	0	Lagrange in 6 mo. Cyclod. 13 mos. Cat. in 15 mos.	RV = 0.6 −3 in 6 mos. 0.1 in 13 mos.
	54	4	5	54	0	0		Occasional L. pain
	1	P of L	7	?	0	0	Hem. in CA—ruptured W.d. Enucleation in 1 mo.	
	2	H.M.	4	16	0	+		
	18	Nil	7	60	+	0		Pain
L 5 0 0 9	66	15	4×6	18	0	0		Lens opaque
	13	P.L.	3.5	25	0	0	E.T. 6 wks. later; pneumonia and prostatectomy	Lens opaque. Occasional pain.
	4	Vit. hem. with cyclo.					E.T. 2 wks.; Lagrange 5 days later. Vit. loss. Cat. 2 wks. later. Shrink. enucl. in 4 mos.	
	5	P.L.	2.5 ×5.5	20	0	+	Ret. hemorrhages	L. prothesis Accident 30 yr. ago.
E.T. 13 mos. Vit. prolapsed	17	4	3.5	30.5	0	0	Ret. hemorrhage	Lens clouded
Buttonhole conj. Vit. prolapsed	3	Nil	6.5	15.5	0	0	L. Scl. below following week	Lens opaque Sl. pain
L 5 10 3 5	3	P of L	7	12	0	0	L. Cat. 1 mo. later	R and L E.T: 1930. Lenses ++ clouded
	23	P of L	7.5	8	0	4	R. cat. and iridectomy 7 mos. later with vascularized cornea	Diabetic Lenses opaque
	23	Nil	5	10	0	0		
	7	Nil	5	80	−	−	Enucleated	2 E.T. before Vit. 1st op.
	15	6	—	12	0	+	2 5 5 5 — 1.5 3 3 1	
	54	P of L	4.5	18	+	+		C.D.
	12	P of L	—	25	0	+		
L 1 1 3 15	4	15/200	3	18	+	+	No change	Mac. hem. L field. L
L 1 1 2.5 25	4	5/200	3	13.5	+	+		Mac hem.
	22	P of L	4.5	33	0	0		
	70	2/200	4	18	−	−		
	18	Nil	6.5	15	+	+		
	57	H.M.	2	29	0	0		C.D.
	15	H.M.	—	N	+	+		
	55	P of L	5	30	0	0		
	19	P of L	5.5	13.5	0	+		
	17	2	3.5	9	+	+		
	14	3/200	2.5	19	0	0		Per. anemia
	13	Nil	5	—	+			Shrunken globe
	5	Nil	4	20	0	0		C.D.
	37	H.M.	5×7	19	+	0		Ch. hem.
	—	—	—	—	−	+	Enuc. 8th day	Exp. hem. ch.
	4	6	4.5	14	0	+		
	3	P of L	3.5	15.5	0	+	Bl. sugar 106	C.D.
	10	7/200	6	10.5	+	+	35.5 without miotic	C.D.
	18	Nil	1.5	17	0	+	Sch. 53, 1 mo. after op. Massage and eserine OK.	Auricular fibrillation
	3	Nil	5	45	+	+		
	72	3/200	3.5	21.5	0	+		
	3	5/200	3	20	0	+	Died. Hypertensive nephritis	
	15	6	—	12	0	−		
	48	2	2.5	12	0	+		
	4	Nil	2	8	−	−	Vit. prolapsed at op. Shrunken globe, enuc.	

Explanation of Abbreviations

Operations
- Ir = Iridectomy
- T = Elliot trephining
- H = Holth
- L = Lagrange
- C = Cyclodialysis
- VF = Vitreous fistula
- It = Iridotasis

Vision
- H.M. = Hand movement
- P of L = Perception of light

* Figure in D.V. column, Table 2, indicates finger counting at that number of feet.

Fields
- B = Bjerrum screen
- L = Lloyd stereocampimeter
- UN = Upper nasal
- UT = Upper temporal
- LN = Lower nasal
- LT = Lower temporal
- C.D. = Choroidal detachment

to nine years on medical care and found only five which retained their initial vision and fields.

Five eyes were blind or industrially blind. One had been enucleated before admission. One was blind on admission after iridectomy for glaucoma and one blind from diabetes. The others had vision of finger counting at 2½ feet and six inches respectively when admitted to the hospital.

Results of operations on eyes with less than 0.1 vision (table 2). The vision in most instances was so poor that reliable fields could not be taken; the results, therefore, must be given in terms of vision and tension.

Of the 30 eyes undergoing Elliot trephining operations, 15 had normal tension with better or as good vision as before operation.

Eight patients had poorer vision, but normal tension.

Five eyes were enucleated following trephining operations; two for postoperative inflammation and shrinking. A third, which had undergone a Lagrange operation and a cataract extraction after the trephining, was removed because of pain and shrinking of the globe. A fourth had a ruptured wound with hemorrhage and the fifth had severe pain and high tension.

Two eyes had very high tension remaining after trephination.

Iridectomy was done in four cases of this group. Two eyes remained unchanged. One was unchanged for four years, then the vision became worse though the tension remained normal. One eye had a rupture of the wound with hemorrhage the seventh week and had to be enucleated.

The Holth sclerectomy was performed in three cases with absolute glaucoma. In one a trephining was done 13 months later and a vitreous prolapse occurred. In the second there was continued high tension with no pain; in the other an expulsive choroidal hemorrhage.

The Lagrange sclerectomy was performed on eight eyes. Two were improved both in vision and tension. In another with high blood pressure the vision remained the same, but the tension was high. In one the vision was worse and the tension remained high. In three others the vision was poorer though the tension was normal. All of these required another operation to keep the tension normal. One of them had an iridectomy and cataract operation seven months after the Lagrange sclerectomy; a second required a trephining three years later and the third a trephination six weeks after sclerectomy. In the eighth case, a blind painful eye had a vitreous-fistula operation but was subsequently enucleated for relief of pain.

Cyclodialysis was performed in three cases of this series. In one, the vision was unchanged and the tension was normal. In the second the vision was worse but the tension was normal. The third had 0.6 vision for six months and a Lagrange operation kept the vision at 0.1 for 13 months.

Iridotasis was performed in a single case of hemorrhagic glaucoma. The vision was perception of light though the tension was normal.

It is interesting to note the condition in the remaining eye of patients blind before or after operations for glaucoma. There were 13 eyes blind before the operations reported in this paper. One eye had been lost through an accident 30 years before. One had been trephined for glaucoma before admission. Two had been removed because of pain from glaucoma and the other nine were blind from glaucoma but were not having symptoms from it. Two patients had no glaucoma in the remaining eye. Eleven patients had vision of from 0.3—1 to 1.5 in the mate for periods ranging from eight months to nine years. One had vision of only hand movements 18 months after the operation on the second eye. One patient had had an iridectomy on the first eye and retained 0.4 vision for the nine years before the second eye was lost. All had normal tension in the second eye though five required miotics to keep it normal. One patient died eight months after the operation but her vision was still 0.6—3 up to that time.

The following are brief summaries of the pathological findings of the enucleated eyes in this series:

Table 2, no. 38
Unhealed and unclosed operative wounds (2) of the corneoscleral junction
Prolapse of ciliary body and retina into the wound tract
Rupture of lens capsule with traumatic cataract
Iridectomy
Inflammatory pupillary membrane
Serous uveitis
Edema of choroid and engorgement of choroidal vessels
Serous detachment of retina
Peripheral anterior synechiae
Posterior sclerotomy wound and
Vitreous hemorrhage opposite this wound

Table 1, no. 54
Active postoperative parenchymatous keratitis and corneal edema
Anterior-root synechiae
Serous iridocyclitis
Prolapse of uvea between wound lips
Remnant of lens capsule present and dislocated toward the region of the wound
Peripheral iridectomy
Serous total retinal detachment
Choroidal and retinal perivasculitis
Edema of ciliary body and
No glaucomatous excavation

Table 2, no. 3
Total anterior synechiae
Posterior synechiae
Complicated cataract
Healed incision in scleral-spur region with some prolapse of uvea
Connective-tissue sward in retrolenticular space
Connective sheath in subchoroidal space (like a tapeworm)
Subluxation of the lens
Total retinal detachment
Mild chronic uveitis
Optic-nerve atrophy and
Glaucomatous excavation filled with glial proliferation

Table 2, no. 20
Anterior-root synechiae
Cyst of iris pigment layer
Serous iridocyclitis
Partial obliteration of anterior chamber
Edema and congestion of ciliary body and choroid
Sclerosis of choroidal vessels
Complicated cataract
Total detachment of retina
Subretinal hemorrhage with cholesterin crystals
Posterior synechiae
Connective-tissue sward in retrolenticular space
Keratitis parenchymatosa
Occlusio and seclusio pupillae and
Slight outward bending of lamina cribrosa but no clear-cut glaucomatous excavation

Table 1, no. 68
Postoperative parenchymatous keratitis
Prolapse of the uvea
Insinking of corneoscleral wound
Operative iridectomy
Subchoroidal and choroidal hemorrhage
Subretinal and ciliary-body hemorrhage
Edema of choroid and ciliary body
Nodular choroiditis
Avulsion of retina from optic-nerve head and prolapse of retina
Cholesterin crystals
Bone formation in choroid and
Aphakia

Table 2, no. 8
Prolapse (or herniation) of iris, ciliary body, and lens through the operative wound
Avulsion of retina
Anterior-root synechiae (minimal)
Glaucomatous excavation filled in with new-formed connective tissue
Questionable central-vein thrombosis
Postoperative parenchymatous keratitis
Edema of choroid and ciliary body

Table 2, no. 48
Subacute endophthalmitis with
Hypopyon and hyphema
Vitreous hemorrhage
Subacute iridocyclitis
Complicated cataract
Atrophy of the iris
Hemorrhage in iris
Perivasculitis of retina and
Ulcerative keratitis

Table 2, no. 27
Traumatic cataract (rupture of the anterior lens capsule)
Atrophy of iris, ciliary body, and choroid
Glaucomatous excavation (flat)
Retinal, subretinal, and choroidal hemorrhages
Anterior episcleral infiltration and
Hemorrhagic retinitis

Table 2, no. 45
Eye was obtained at post mortem
Advanced obliterating endarteritis (especially the central retinal artery)

Table 2, no. 13
Insinking of operative wound with overriding of corneal lip
Edema of the cornea and postoperative parenchymatous keratitis
Serous detachment of the choroid
Edema and hyperemia of the choroid
Complete serous detachment of the retina
Cyclitis
Anterior synechiae
Aphakia
Hemorrhage and capsular proliferation in the cyclitic membrane and
Avulsion of optic-nerve head

Table 1, no. 71
Trephine of cornea (filled with connective tissue)
Peripheral (operative) iridectomy
Anterior peripheral synechiae

Inflammatory pupillary membrane
Fibrinous iritis
Atrophy of iris and ciliary body
Verrucca of lamina vitrea of the choroid

There is no evidence of glaucomatous excavation of the optic nerve. The retina and choroid are essentially normal. The retinal and choroidal vessels do not reveal any changes of a sclerotic nature, and no hemorrhages are seen. This patient probably had an attack of glaucoma and after the trephination reacted with an exudative iritis. With the formation of a pupillary membrane and closure of trephine opening, there was a recurrence of the glaucoma (perhaps secondary), causing the excessive pain which was the primary cause for enucleation.

Thirteen eyes with hydrophthalmos are presented. The ages of these patients ranged from 3½ months to seven years. In the series were two brothers aged 5 and 7 years. The father had megalocorneae with normal vision and tension. Both eyes of the brothers were operated upon. The vision in the younger is R.E. 3, L. 5/200, and in the elder R.E. 2+1, L. perception of light after operation. Two operations were performed on the right and four on the left eye of the elder. The younger underwent two operations on his left eye.

Most of these patients were too young to allow accurate vision or tension to be recorded. One 3½-month-old infant has already had two operations. In one case, observed for 18 years, vision has been maintained at 0.6 —3 with full peripheral and Bjerrum fields to date with one trephine operation. Vision in the other eye is only perception of light following three trephine operations. This patient had an hypopyon in his better eye 10 years ago. In spite of many attacks of conjunctivitis and hordeolum, this was his only infection; in fact, it was the only late infection in this series.

Twelve trephinings and one Lagrange sclerectomy were performed on these patients, who are yet too young and have not been under observation long enough to allow any conclusions to be drawn as to the ultimate results. Only a filtration operation can be expected to bring about improvement in such cases.

Summary and conclusions

The anterior chamber was shallow and the cornea steamy when the tension was more than 50 mm. Hg.

The "middle pressure" was approximately the same as the intraocular tension in glaucomatous eyes under miotics and closely approximated that figure in patients with less than 50 mm. of pressure.

Fields constricted to within a few degrees of the fixation point in glaucomatous eyes are no contraindication to surgical treatment.

One late infection in fistulating operations occurred among 156 eyes and this one recovered 0.6 —3 vision.

The Elliot trephining operation was found to be the most satisfactory surgical procedure in chronic glaucoma.

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References

[1] Salvati, G. Rev. ottal. Oriente, 1934, v. 4, pp. 63-68.
[2] Eerola, A. Acta Ophth., 1935, v. 12, p. 137.
[3] Kotljarewskaja. Sovietskii Viestnik Opht., 1935, v. 6, p. 58.
[4] Del Barris, A. Arch. de Oft. Hisp.-Amer., 1935, v. 35, p. 355.
[5] Etienne, J. Ann. d'Ocul., 1935, v. 172, p. 827.
[6] Philippow, N. Sovietskii Viestnik Opht., 1935, v. 6, p. 51.
[7] Knapp, A. Arch. of Ophth., 1933, v. 10, p. 298.

OCULAR CHANGES IN MULTIPLE SCLEROSIS

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Ocular changes in multiple sclerosis are frequent, and may be listed as: (1) changes in the extraocular muscles; (2) pupillary abnormalities; (3) nystagmus; (4) fundus changes, confined to the nerve head; (5) retrobulbar neuritis; (6) changes in the visual fields. The frequency of these manifestations in a series of 100 consecutive cases of multiple sclerosis is presented. A case report is detailed in which the diagnosis was made by exclusion and by hemianopic field changes. From the Department of Ophthalmic Surgery, Medical School, University of Michigan.

In about half of all cases of multiple sclerosis there are visual disturbances at some time. The disease usually is rich in ocular symptoms, since the degeneration plaque may develop at any part of the visual pathway. More important is the fact that the ocular symptoms are often the first manifestation of the disease, with none other appearing for perhaps many years, the longest reported remission having been 32 years.[1] The early ocular signs may be overlooked by both patient and physician, because they are so transient. Since statistical studies of a series of multiple-sclerosis patients from the ocular aspect are not very numerous or very recent, this summary of such a review of 100 cases, together with the detailed report of a case showing only visual-field changes of hemianopic type, is offered both as a corroboration of previous authors, and as a reminder to ophthalmologists and neurologists of the important part that the eye plays in the diagnosis of the disease.

General facts

Multiple sclerosis is a disease of unknown etiology occurring usually in patients between the ages of 20 and 40 years. Next to syphilis it is the most frequent disease of the nervous system, and in private practice may exceed syphilis. It is rarely found in patients under 12 years or over 50 years. Our patients averaged 27.9 years at the onset of their first symptoms, and 31.8 years when first admitted to the hospital. The average of four years between onset and first medical consultation agrees exactly with the figure of Birley and Dudgeon.[2] Age at the onset of first symptoms ranged from 11 to 48 years. The cases were about evenly divided as to sex, though most authors have found a definitely higher frequency in females.

Table 1

GENERAL DATA ON A SERIES OF 100 CONSECUTIVE CASES OF MULTIPLE SCLEROSIS

Total number of patients: 100	Males: 52
	Females: 48
Average age when first admitted: 31.8 years	
Average age at onset of first symptom: 27.9 years	
Diagnosis of multiple sclerosis proved at autopsy: 1	
Diagnosis of multiple sclerosis positive on eye findings only: 1	
Additional diagnosis of psychoneurosis: 4	
Did not have examination by an ophthalmologist: 25	
Blood Kahn reaction negative: 100	

The series of 100 patients reported here presented consecutive, unselected cases so diagnosed by the Department of Neurology, excluding only those in which the diagnosis was uncertain. Of this group 75 percent had a routine examination by the Department of Ophthalmology. The blood Kahn reaction in each case was negative. Diagnosis was based on clinical findings, proved in one case at autopsy, and on eye findings alone in the single case detailed below.

History

Every possible symptom of any neuropathology may be found in multiple sclerosis. Ocular complaints consist usually of reduced visual acuity or blurring, diplopia, and sometimes field defects noted subjectively. Adie found that when the onset of the disease was characterized by one symptom, these were usually (40 percent) ocular.[1] The course is usually irregular or discontinuous. Visual symptoms are very im-

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portant in the early diagnosis of the condition. They are often mistaken for those of psychoneurosis, retrobulbar neuritis, tabes, and toxic amblyopia. The visual disturbance may be unilateral or bilateral, often develops quickly, and usually is transient, leaving little or no permanent defect. Seldom are both eyes affected seriously at the same time. Temporary poor vision may be the only evidence of multiple sclerosis manifested for many years. Permanent complete blindness is extremely rare, so that a good prognosis for vision can always be given.

Table 2

SYMPTOMS, TIME OF THEIR ONSET, AND VISION, IN 100 CASES OF MULTIPLE SCLEROSIS

History

Symptoms noted by patient

	Percent	
Poor vision:	42	52 percent of all patients
Field defects:	3	
Diplopia:	22	

Course of ocular symptoms

	Percent
No remissions:	5
At least one remission:	23
Progression of symptoms:	7
Regression of symptoms:	15

Onset of ocular symptoms before onset of others: 16 percent

	Percent
Less than 3 months before:	6
Less than 1 year before:	4
Less than 5 years before:	5
Less than 10 years before:	1

Onset of ocular symptoms after onset of others: 35 percent

	Percent
Less than 1 month after:	9
Less than 6 months after:	9
Less than 1 year after:	3
Less than 5 years after:	9
Less than 10 years after:	4
Less than 15 years after:	1

Vision

Best obtained except when vision was observed to fail and recover.
Majority were examined only once.

	O.D.	O.S.
6/6	26	30
6/9	22	21
6/12 to 6/30	12	17
6/60 and less	11	3

Table 2 presents a summary of the ocular symptoms of 100 patients. In one third of the patients who had ocular complaints, these preceded all other symptoms of the disease, sometimes by a period of many years. In this series 52 percent noted poor vision, a field defect, or diplopia at some time in their history. This figure agrees with those of Uhthoff[3] and later writers. We found only about one sixth of the series starting with visual symptoms.

Examination

Ocular abnormalities in multiple sclerosis may be listed as: (1) changes in the extraocular muscles. These may cause diplopia. (2) Alterations in the pupillary reactions. (3) Nystagmus, in some cases due to the muscle changes. (4) Fundus changes, confined to the nerve head. (5) Retrobulbar "neuritis." (6) Changes in the visual fields. (7) Reduced visual acuity is due to one of the last three factors, perhaps rarely to nystagmus.

Vision

A history of blurring or a sudden loss of vision lasting for days or weeks is valuable evidence in confirming the diagnosis. Lacking this, subnormal vision alone must be considered with skepticism, unless a careful refraction is performed. Routine refraction was impossible in most of the patients in this series. Poor vision may be due to pathology, as a central scotoma or optic atrophy, or merely to an error of refraction. The vision given in table 2 is the best obtained at the time of examination, except in those cases where, under observation, vision failed, due, undoubtedly, to the disease.

Nystagmus

Statistics on the frequency of nystagmus vary widely, owing at least in part to inconsistency in separating nystagmoid jerks and true nystagmus. All authors agree that the latter is of infinitely greater diagnostic importance. The two cannot be satisfactorily divided except in their extremes. Figures on several series, compiled by Brain,[4] give a majority estimate as 70 percent, and this was exactly our figure, if all types of nystagmus and nystagmoid jerks are added (table 3). A commission on mul-

tiple sclerosis in 1922[5] decided that in this disease nystagmus is the most frequent motor disturbance in the sphere of cranial-nerve innervation. Some writers[6] believe that only high degrees can be relied upon in reaching a diagnosis. Klingmann[7] noted that early blurring of vision might be due to weak innervation of the extraocular muscles causing nystagmus, but not reaching the stage of diplopia. Williamson-Noble[8] believes that apart from brain tumors, nystagmus is found most commonly in multiple sclerosis. He described an early finer oscillatory type, and a later coarse variety, both due to disturbance in the vestibulo-oculomotor paths.

Table 3

EXTERNAL FINDINGS IN 100 CASES OF MULTIPLE SCLEROSIS

Nystagmus:
- Absent: 30 percent
- Only nystagmoid jerks: 16 percent
- Nystagmus in horizontal plane: 34 percent
- Nystagmus in horizontal and vertical planes: 17 percent } 70 percent
- Rotary nystagmus: 1 percent
- Rotary and horizontal nystagmus: 2 percent

Anisocoria: 16 percent
Miosis: 0
Atypical Argyll Robertson pupil: 2 percent

Muscles:
- Weakness of lateral rectus only: 9 eyes in 5 patients
- Weakness of mesial rectus only: 3 eyes in 2 patients
- Weakness of other muscles of iii* only: 4 eyes in 2 patients
- Weakness of lateral rectus and some of iii*: 2 eyes in 1 patient
- Normal muscles in 90 percent of patients.
- Weakness of 1 or more conjugate deviations: 4 percent

* Third-cranial-nerve innervation.

Pupillary changes

Over 30 years ago Uhthoff wrote[3] that pupillary anomalies are rare and not diagnostically important in disseminated sclerosis. With individual exceptions this opinion is still widely held. An Argyll Robertson pupillary reaction can occur, but is rare.[9] Findings in our series are given in table 3.

Ocular palsies

Brain[4] concludes that although diplopia occurs in 30-40 percent of cases, paresis of single muscles is not common, and of conjugate movements rare. On the contrary Parsons[10] says that the pareses are usually of associated movements. Uhthoff was first to note that the external rectus is affected oftener than any other muscle. He found a muscle paralysis in 20 percent. Our series showed it in only 10 percent, divided as shown in table 3. The details compare fairly closely with those of Sachs.[11]

Paralyses of the extraocular muscles in multiple sclerosis are rarely permanent, being usually transient and incomplete. Complete ophthalmoplegia is very rare, though Veraguth[12] has described total ophthalmoplegia interna.

Fundus changes

Changes visible with the ophthalmoscope in disseminated sclerosis are limited to the nerve head. The classical change is a temporal pallor or atrophy, stressed in importance and frequency by Uhthoff, and by most authors after him. Certain it is that temporal pallor positively diagnosed is of great significance, but the difficulty of distinguishing accurately between normal and abnormal temporal paleness of the optic disc robs this sign of much of its value.[13] The same is true of mild blurring of the disc margins. Enthusiasm may breed error. In searching for confirmatory evidence for the diagnosis of multiple sclerosis, it is easy to see in a normally hazy disc an optic neuritis, and an optic atrophy in a normal relatively pale temporal half of a disc. We suspect that many ophthalmologists and neurologists have fallen into this error.

A sclerotic plaque in the optic nerve close behind the globe may produce a transient mild inflammation and edema of the nerve head in the fundus, followed later by atrophy. Lesions more posterior in the nerve cause no fundus change until atrophy ensues. Thus the most frequent alteration seen with the ophthalmoscope is atrophy of the nerve, though in early cases a mild optic neuritis may be found, and even papilledema has been reported.

H. Cohen[14] claims that temporal pallor will be found in most cases if routine examination is done, and that neuritis is more frequent than texts would indicate. Klingmann[7] claims that nine of his 12 cases showed atrophy of the inferior temporal quadrant, corresponding to the papillomacular bundle. This is the type most frequent in multiple sclerosis, but such high frequency is not found in the average series. Those compiled by Brain[4] showed pallor of the disc ranging from 32.6 to 57.6 percent. The amount of pallor is not always related to the visual acuity. Uhthoff in 1889 found that the entire nerve may be diseased behind the globe, despite a normally appearing fundus.[15]

Only 20 percent of our series showed ophthalmoscopically some type of optic atrophy in one or both eyes. An additional 4 percent showed blurring of the disc or definite neuritis, but no case of papilledema was seen. Types of atrophy are shown in table 4. All observers have found that seldom in multiple sclerosis is there a permanent complete atrophy, or a permanent severe blindness, especially in both eyes of the same individual. Pallor of the disc may persist but vision recover completely.

Table 4

FUNDUS AND FIELD CHANGES IN 100 CASES OF MULTIPLE SCLEROSIS

Optic Disc

	O.D.	O.S.
Normal	77	83
Only papillomacular-bundle atrophy	1	0
Only temporal pallor or atrophy	10	7
Partial primary atrophy	4	3
Complete primary atrophy	1	0
Partial secondary atrophy	3	4
Blurring or neuritis	4	3

Field Changes

(Only 53 tested)

	O.D.	O.S.
Normal	39	38
Only central scotoma	5	0
Only paracentral scotoma	1	8
Only peripheral defect	4	4
Paracentral scotoma plus a peripheral defect	2	1
Tubular or fatigue field	2	2
Diagnosis of retrobulbar neuritis	3	1

Field pathology present in 20 percent of patients.

Hemianopsia and quick changes in one patient.

Retrobulbar neuritis

Uhthoff, who was one of the first thorough students of ocular signs in multiple sclerosis, claimed that 95 percent of all retrobulbar neuritis is caused by multiple sclerosis. Other estimates range down to 28 percent.[16] It is of interest that in our series this diagnosis was made in only four patients. Since the central scotoma indicating retrobulbar neuritis is usually relative in multiple sclerosis (though absolute in ordinary retrobulbar neuritis[10]), it may be that search for this defect was not careful enough in our series. The scotoma is easily overlooked.

Since the papillomacular fibers, of all the optic nerve, are most sensitive to disease and toxin, they often are the first affected by the degeneration plaque of multiple sclerosis. The resulting central scotoma is misleading unless the physician always has such a diagnosis in mind. Technically, of course, the disease is a plaque of degeneration, and therefore cannot be properly called a neuritis. The prognosis again is good for vision. The nerve sheaths degenerate, glial proliferation follows, but the axis cylinders are usually not permanently affected; hence the scotoma and reduced vision disappear in a few weeks. Acute retrobulbar neuritis may be the first manifestation of multiple sclerosis (11 percent).[4] We have seen this recently in a young woman. Adie is especially urgent in claiming that most or all acute unilateral retrobulbar neuritis is due to multiple sclerosis. Brain advises logically that every case for which no cause for the neuritis can be found, should be studied for multiple sclerosis.

Visual-field changes

Since the lesion may lie anywhere in the visual pathway, changes in the visual fields are frequent. Characteristic is their variability. They may be of any shape, size, location, and intensity, and may show rapid, bewildering changes in any of those respects. The defects appear, wander, disappear, and reappear, corresponding to the course of the disease plaque. A central scotoma is frequent, as noted above. Paracentral relative scotomata, usually small and difficult to discover, are frequent, according to Klingmann. Irregular peripheral defects are relatively common. Regular peripheral constriction must be differentiated from tubular fields, which, with fatigue fields, are found not infrequently. Fundus changes and field defects show little interrelationship. According to Cohen, the earliest field change is a relative scotoma for color.

Visual acuity and visual-field changes are of more importance in diagnosing and following the course of the disease than the appearance of the fundus. Transient defects and evidence of more than one lesion are highly suggestive of multiple sclerosis. Field changes showing steady progress are not characteristic of the disease. Dyschromatopsia is rather frequent.

Field changes in our series of 100 patients are listed in table 4. Only 53 percent had field determinations. Twenty percent of the patients showed field defects. For the most part these field determinations were routine tests. It is possible that with special care and attention, more cases of relative scotomata could have been found.

Especially in connection with the case about to be reported, the occurrence of hemianopsia in multiple sclerosis is of interest and importance. Contrary to the American Encyclopedia of Ophthalmology,[17] which claims that it never occurs, most authors agree that it can and does occur, though perhaps less frequently than might be expected. Lloyd[18] feels that more recent finer diagnostic methods have revealed relative hemianopsia that was previously overlooked. Traquair,[19] whose excellent work gives the most complete review of field changes in the disease, points out that lesions may "affect the tracts in the same way as the optic nerves or chiasm. . . . Homonomous hemianopic defects, varying in extent from a small hemianopic central scotoma to the loss of a quadrant or half the field, occur, and central vision is involved. . . . Apart from their hemianopic character these field changes do not differ in onset or course from those of multiple sclerosis affecting other parts of the visual path."

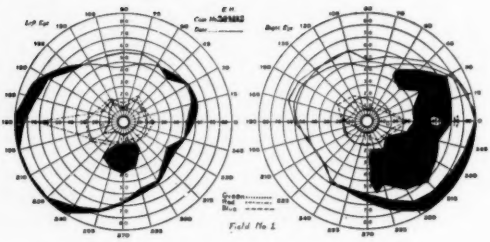
As an example of hemianopsia in multiple sclerosis, of rapidly changing field defects, of diagnosis based positively on field changes alone and otherwise only on exclusion, we wish to offer the following case report, one in the series of 100 patients.

Report of case

Mrs. E. H. aged 30 years, an ex-nurse and a physician's wife, was referred to the University Hospital by her local physician. One month before, the patient had noted a shadow or blind area in the temporal field of the right eye, moving with eye movements. It had not changed subjectively since its onset. There had been no symptoms in the left eye, nor ocular pain. After two weeks she visited her oculist, who found in the visual fields a right temporal defect that had since enlarged slightly, and a small left temporal scotoma.

The patient had bruised easily all her life. For many years she had had a tenderness and at times a small tumor mass low in the right abdomen which, despite extensive study, had never been diagnosed. These abdominal symptoms were not related to meals, defecation, or to her purpuric spots. Exploratory operation of the abdomen several years ago had revealed no pathology, and a normal appendix had been removed. For three years, starting eight years before, while a nurse at a leading clinic, she had a repeated leukocytosis. For two or three years the patient had been treated for pyelitis and cystitis, with hematuria one year before this examination, the urine then showing B. coli. There was a history of recurrent upper respiratory infections and influenza over the past 10 years, each attack associated with urinary symptoms. During pregnancy a year and a half before this visit, she had had hyperemesis and pyelitis. Fourteen weeks before this admission she had a perineal lesion, resembling abscess, lasting 10 days, and six weeks later a recurrence, lasting a few days. The discharge was purulent but odorless, and could not be explained by her gynecologist. One week before onset of the present illness there had been a localized pain on the left frontal and supraorbital region; it was transient, lasting from a few

Fig. 1



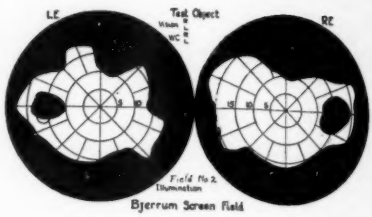
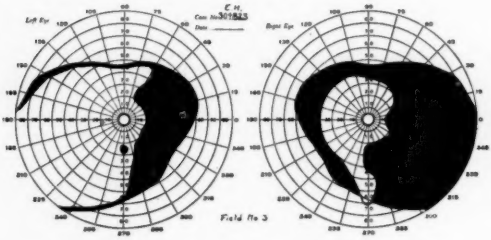


Fig. 3



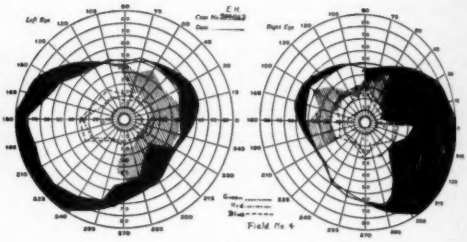
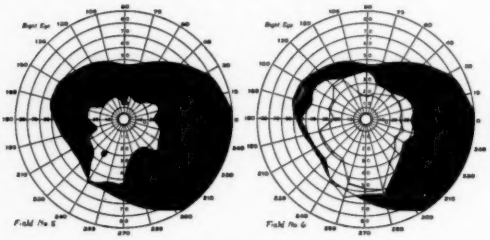


Fig. 5-6



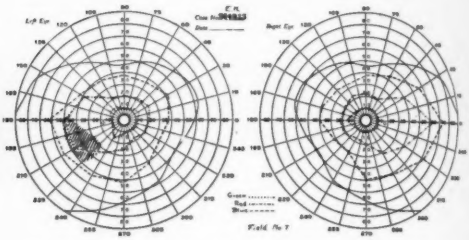
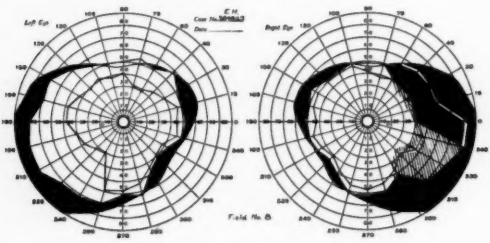


Fig. 8



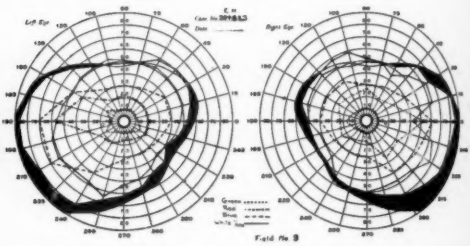
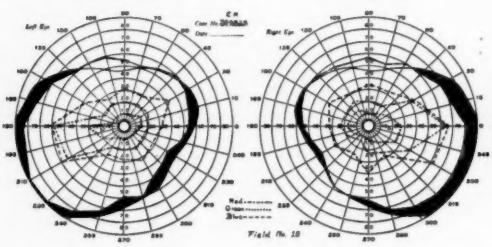


Fig. 10



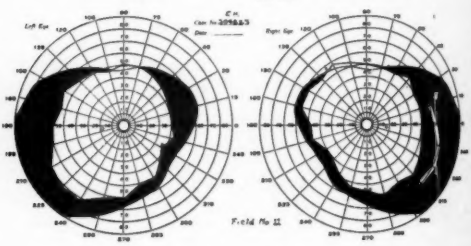
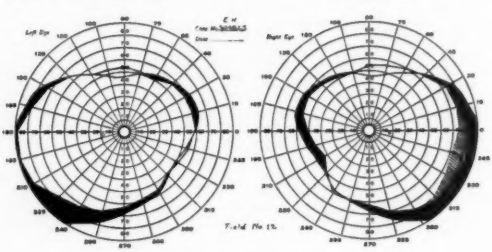


Fig. 12



minutes to an hour, occuring once daily for one week.

Uncorrected visual acuity was O.D. 6/6 —2, and O.S. 6/6 +1. The eyes were straight and extraocular movements normal. There was no nystagmus, and no external pathology. Pupils were round and equal, with normal reactions to light, consensually, and in accommodation. Tactile tension was normal. Pupils dilated widely and evenly after instillation of a mydriatic. The fundi were entirely normal, the discs of normal color throughout. The physiologic cup was deep and the lamina cribrosa plain. Pigment rings were distinct. Maculae, vessels, and periphery showed no abnormality.

The visual fields were carefully determined, and were considered to be very accurate because of the unusual coöperation and intelligence of the patient. On the perimeter (fig. 1) with 5-mm. test objects in O.D. a very large temporal scotoma was found with a small island of vision in it on the horizontal meridian. Color fields were moderately contracted. The left eye showed a moderately large scotoma to a 1-mm. object below, lying in the midline, and there was interlacing of blue and red in the temporal field. Central fields on the Bjerrum screen with 1-mm. white object (fig. 2) showed slightly enlarged blind spots.

A neurological examination on the same day showed no abnormality. The cranial nerves functioned normally. No abnormal reflexes were noted.

Medical examination showed that the cecum was palpable, and its palpation caused pain such as the patient had previously noted. Otherwise the general medical clinical examination was negative. Blood studies showed: Leukocytes 12,600; red-blood-cell count 4,070,000; hemoglobin 75 percent (Sahli); differential leukocyte count: Polymorphonuclears 67 percent, basophiles 1 percent, eosinophiles 2 percent, lymphocytes 23 percent, monocytes 7 percent. Venous blood in 6-mm. test tubes coagulated in from 7 to 10 minutes, or a normal range for this method. Normal firm clots were retracting 12 hours later. Bleeding time by Duke's ear-puncture method was 2½ minutes, or normal. Medical consultant believed these findings essentially normal, and that the purpura mentioned in history might well be nothing more than the easy bruising which occurs sometimes in women, or possi-

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Fig. 1 (Marshall and Laird). Perimetric fields on first examination. Vision: O. D. 6/6 —2; O.S. 6/6 +1, uncorrected. Test objects: 5 mm. round white, and colored as noted. Scotoma O.S.: 1 mm. white. Distance: 250 mm. Illumination: 10 foot-candles.

Fig. 2 (Marshall and Laird). Central fields on tangent screen on first examination. Test object: 1 mm. round white at 1000 mm. Illumination: About 7 foot-candles.

Fig. 3 (Marshall and Laird). Perimetric fields by local oculist 12 days after first examination. Test object: 2 mm. white at 250 mm.

Fig. 4 (Marshall and Laird). Perimetric fields two weeks after first examination. Vision: O.D. 6/9 +3; O.S. 6/9, uncorrected. Test object: 5 mm. at 250 mm. Illumination: 10 foot-candles.

Fig. 5 (Marshall and Laird). Perimetric field right eye two weeks after first examination using a 1-mm. test object at 250 mm.

Fig. 6 (Marshall and Laird). Perimetric field right eye three weeks after first examination. Vision: 6/5 —2. Test objects: Outer boundary 5 mm. white at 250 mm.; Inner line 1 mm. white at 250 mm. (Patient too dizzy to determine field for left eye.)

Fig. 7 (Marshall and Laird). Perimetric fields five weeks after first examination. Vision: O.D. 6/6 +2; O.S. 6/6 —2, uncorrected. Colors: 5-mm. test objects at 250 mm. Scotoma O.S.: 1 mm. white at 250 mm.

Fig. 8 (Marshall and Laird). Perimetric fields five weeks after first examination. Outer boundary 5 mm. white at 250 mm. Inner boundary 1 mm. white at 250 mm.

Fig. 9 (Marshall and Laird). Perimetric fields nearly two months after first examination. Vision: O.D. 6/5 —2; O.S. 6/6 +3, uncorrected. Test objects: Inner solid line 1 mm. form at 250 mm. Remainder 5 mm. at 250 mm.

Fig. 10 (Marshall and Laird). Perimetric fields four months after first examination. Vision: O.D. 5/5; O.S. 5/5 —2, uncorrected. Test objects: 5 mm. white and colored at 250 mm.

Fig. 11 (Marshall and Laird). Perimetric fields four months after first examination using 1 mm. white at 250 mm.

Fig. 12 (Marshall and Laird). Perimetric fields by local oculist five months after first examination and six months after onset of symptoms. Test object: 2 mm. white at 250 mm.

bly a symptomatic purpura on a toxic basis. Further investigation of possible toxic foci was advised.

X-ray films of the skull showed very slight rarefaction of the posterior clinoids, more on the right than left, but within normal variation. Neurosurgical consultant felt there was no definite evidence of any sort of pituitary lesion.

On the basis of the field changes, and otherwise negative evidence of neurological disease or intracranial lesion, a tentative diagnosis of disseminated sclerosis was made. A toxic neurological lesion was considered possible, and to be ruled out, the most likely source being kidney or bladder.

The patient returned home, but was readmitted to the hospital two weeks later for further studies. There had been no subjective change. The fundi were entirely normal. Uncorrected visual acuity was O.D. 6/9 + 3, and O.S. 6/9, a definite decrease in two weeks. Ocular examination otherwise was negative as before except for visual fields. Fields taken by her local oculist two days before had shown a definite right homonomous defect (fig. 3). They now showed the same (fig. 4). Except for two small peripheral islands of vision, the entire lateral portion of the right field was gone to a 5-mm. white object at 250 mm., but with a very irregular mesial boundary. Above and nasally there was very definite constriction. To a 1-mm. object the temporal and superior defect was greater (fig. 5). The left eye showed nasally a large relative scotoma to a 5-mm. object, similar to that noted previously on the temporal side of the field in the right eye (fig. 1). This scotoma now present in the left eye definitely crossed the midline below. These fields showed great progress of the defects present 18 days before.

The patient was feeling well, without headaches or nausea. Extraocular movements remained normal and without nystagmus. There was no palsy of the face, tongue, or extremities, and no tremor. Biceps and triceps reflexes were normal, knee and Achilles reflexes slightly increased. Sense of vibration, motion, position and deep pain was normal in the legs. Spinal-fluid pressure was 40 mm., the fluid being clear and normal, except for two cells per cu. mm., and a Gold Sol curve of 0011000000. Kahn tests on blood and spinal fluid were each negative. Neurological examination showed in brief no significant pathology.

The Department of Urology found only a few bacilli in a catheterized urine specimen, and 5 to 10 white blood cells per high-power field, concluding that in view of negative pyelographic studies made one year before, the urinary tract was not to be regarded as a causative factor in the patient's complaint.

Five days after this admission kidney-concentration studies were made by Dr. Floyd H. Lashmet, using his own method. These were practically normal. His impression was that the patient had had a chronic streptococcic infection with mild renal involvement and recurrent exacerbations.

Chest X-ray films showed no gross pulmonary pathology. Gynecologic examination showed no pathology except tenderness in both lower quadrants, and many gram-positive bacilli and cocci in the vaginal smear; potassium permanganate douches were advised. It was not felt that the pelvis was a focus of infection. Nearly two months after onset of symptoms the Department of Neurology still could find no signs of diagnostic significance, and suggested disseminated sclerosis as the etiologic factor. Clinical examination of the nose, throat, ears and sinuses was negative.

Following lumbar tap the patient was dizzy for at least a week, for, one week later, she was too ill to have a check made of visual fields in both eyes. That in the right eye showed little change (fig. 6). She was discharged to go home the next day, with a diagnosis of disseminated sclerosis based on field changes and by exclusion. Her husband was instructed to give her iron, quinine, and strychnine tonic, and Fowler's solution.

She returned in 10 days, having used Fowler's solution up to 30 min. a day, and the tonic noted. She felt better. Vision O.D. was 6/6 + 2, O.S. 6/6 — 2. Fundi were normal. Visual fields showed considerable improvement, but with a new scotoma in the temporal field O.S. (figs. 7 and 8).

Eighteen days later, or nearly three months after onset of ocular symptoms, the patient had no constitutional complaints, and a marked subjective improvement in vision. Uncorrected visual acuity was in the right eye 6/5 — 2, and in the left 6/6 + 3. The fundi were still normal in all respects. Neurological examination was negative. Visual fields (fig. 9) were normal. The iron tonic and Fowler's solution were stopped.

Nearly four months after her first admission visual acuity uncorrected O.D. was 5/5, and O.S. 5/5 — 2. The patient felt better than she had for some time. Fields were normal for a 5-mm. object, but with a 1-mm. object at 250 mm. the temporal defect O.D. was still recognizable (figs. 10 and 11). Fields taken by the home physician five weeks later, or six months after the onset of symptoms, were normal except for a slight relative defect or contraction of the temporal field in the right eye (fig. 12).

Now, four years later, the patient reports that she has had no further trouble, and no ocular complaints, except during a pregnancy which had to be therapeutically interrupted. Unfortunately no oculist saw her during that period.

Summary

A review of history and ocular findings in 100 consecutive cases of multiple sclerosis is presented. In general the frequency of ocular pathology corresponds closely with statistics reported

by previous writers. In addition a case of hemianopsia is reported in which diagnosis of multiple sclerosis was based entirely on field changes. The article aims to remind ophthalmologists and neurologists of the important and frequent part the eye plays in the diagnosis of the disease.

Bibliography

[1] Adie, W. J. Etiology and symptomatology of disseminated sclerosis. Brit. Med. Jour., 1932, v. 2, Dec. 3, pp. 997-1000.

[2] Birley, J. L., and Dudgeon, L. S. A clinical and experimental contribution to the pathogenesis of disseminated sclerosis. Brain, 1921, v. 44, July, p. 150.

[3] Uhtoff, W. The significance of the eye symptoms in disseminated sclerosis of the brain and spinal cord. Ophthalmoscope, 1905, v. 3, Sept. 1, pp. 429-436.

[4] Brain, W. R. Disseminated sclerosis—A critical review. Quarterly Jour. Med., 1930, v. 91, April, pp. 343-391.

[5] Association for Research in Nervous and Mental Diseases. Multiple sclerosis. New York, Paul B. Hoeber, 1922, p. 126.

[6] Oppenheim, H. Textbook of nervous diseases. Transl. of 5th German Ed. of 1908, New York, G. E. Stechert & Co., 1911, pp. 332-350.

[7] Klingmann, T. Visual disturbances in multiple sclerosis. Jour. Nerv. and Ment. Dis., 1910, v. 37, pp. 734-748.

[8] Williamson-Noble, F. A. Eye signs in nervous diseases. Clin. Jour., 1933, v. 62, Dec., pp. 483-491.

[9] Abramson, J. L., and Teitelbaum, M. H. The Argyll Robertson phenomenon in multiple sclerosis. Amer. Jour. Ophth., 1933, v. 16, Aug., pp. 676-682.

[10] Parsons, J. H. Diseases of the eye. Ed. 6, New York, Macmillan, 1931, pp. 560-561.

[11] Sachs, B. See 5 above, pp. 50-51.

[12] Quoted in 4 above.

[13] Holden, W. A. See 5 above, pp. 102-108.

[14] Cohen, H. The early diagnosis of tabes dorsalis and disseminated sclerosis. Clin. Jour., 1933, v. 62, Aug., pp. 314-318.

[15] Taylor, E. W. See 5 above, p. 184.

[16] Shield, J. A. Disseminated sclerosis. Southern Med. Jour., 1932, v. 25, Nov., pp. 1116-1121.

[17] The American Encyclopedia and Dictionary of Ophthalmology. Wood, C. A., Chicago, Cleveland Press, 1915, v. 6, pp. 4041-4044.

[18] Lloyd, R. I. Visual field studies. New York, Technical Press, 1926, pp. 167-170.

[19] Traquair, H. M. An introduction to clinical perimetry. St. Louis, C. V. Mosby Co., 1927, p. 206.

GLAUCOMA IN AMBLYOPIA

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A normal working gland or muscle requires and usually receives more blood than a similar organ that is not working. In cases of subnormally functioning organs the blood supply is physiologically decreased. Such organs cannot call upon the same extensive vascular response that is obtained by normal tissue. This is shown by the lessened response of amblyopic eyes to anterior-chamber puncture. The author believes, therefore, that primary glaucoma should be relatively infrequent in such eyes. A search of the literature supports this opinion, for no definite case of chronic primary glaucoma in an amblyopic eye was found, and only one case of acute glaucoma in such an eye. It is assumed, in explaining the infrequency, that a critically important increased inflow of fluids is less likely to occur in such amblyopic eyes. Because the vascular crisis is greater in the acute than in the chronic form, the former is considered the more likely to occur. A case of acute glaucoma in amblyopia is here recorded.

The physiologic principle emphasized by the author in a criticism of a proposed test for glaucoma[1] was that a working organ (gland or muscle) requires and usually receives more blood. In cases of subnormally functioning organs, the blood supply decreases by physiologic means. Such organs cannot call upon the same extensive vascular response that is obtained by normal organs. In the article to which reference has been made, attention was called to the lowered response of amblyopic eyes to anterior-chamber puncture as compared to that of normal eyes.

The response to puncture of atropinized eyes was also indicated to be subnormal. The data furnished by Adler and Landis[2] on the protein content of the aqueous tend to support the author's opinion concerning the vascular response of physiologically normal and subnormal organs.

L. Bothman[3] recently called the writer's attention to the relative rarity of senile cataract in amblyopic eyes. This may possibly be explained by the reduction of activity on the part of the ciliary body with a decrease in exposure of the lens to noxious substances in the blood.

The literature reveals no reference to the incidence of chronic primary glaucoma in an amblyopic eye. It is possible that such cases have been seen but that the relationship to the problem of glaucoma was not considered important. The writer believes that cases of chronic primary glaucoma in amblyopia are considerably less frequent than the incidence of amblyopia would justify, and that such cases have not been reported because they have rarely been observed.

While acute glaucomatous attacks have been described with relative frequence, reference to such attacks in an amblyopic eye has been found but once. This was in the report of a case of mydriatic glaucoma by H. Gifford[4] in 1916. The acute glaucoma occurred in a female aged 69 years. The right vision was 20/20. The left eye, slightly convergent and amblyopic since childhood, had 20/70 vision. There were slight lenticular and vitreous opacities in each eye. One drop of 4-percent homatropine was instilled into the conjunctival sac of each eye for the purpose of dilating the pupils for facilitating study of the fundi. Eserine was instilled later into the right eye but nothing was used in the left eye (through oversight). An attack of acute glaucoma in the left amblyopic eye occurred that evening.

It is desired here to report a case of acute glaucoma in an eye undoubtedly amblyopic following early convergent strabismus.

Case Report

E. Y., a female, aged 55 years, was first seen in July, 1933. There was a history of pain and decreased left vision of four weeks' duration. The pain was especially marked in the mornings.

The past history revealed no trouble in the right eye since childhood. There had been a right convergent strabismus since early infancy following what may have been a gonorrheal ophthalmia. The right vision had always been poor. When the first pair of glasses was pre-

scribed the patient was 23 years old, and she had been told that no glass would help the right vision. The left eye had had vague visual disturbances periodically during the past year. The condition had become much worse during the last four weeks while on her return from Europe to see her only child whom she had not seen in 10 years.

Examination revealed a typical case of acute glaucoma in the left eye, with an intraocular tension of 60 mm. (Schiötz), and vision reduced to the ability to count fingers at nine feet. The right eye converged 10 degrees, but except for a diffuse superficial central corneal opacity was without pathology. Tension in this eye was 12 mm. (Schiötz) and vision the ability to count fingers at seven feet.

A total iridectomy combined with an Elliot trephining operation was done within 24 hours, as medical care gave no relief. Within 48 hours after operation on the left eye, the right eye (previously never involved), developed an acute glaucoma, despite prophylactic use of eserine at four-hour intervals. More frequent use of miotics controlled the tension. On the morning of the third day after the operation the right eye again showed an increased tension which responded to more frequent use of miotics. The patient was discharged from the hospital on the seventh day after operation. Atropine was continued for the left (operated-on) eye and miotics were prescribed for use in the right eye. Eight days later the patient returned with an acute glaucomatous attack in the right eye. Vision in the left eye with +1.75 D. sph. ⌯ +0.50 D. cyl. ax. 90° = 0.3 and left tactile tension was normal. The pain in the right eye was severe and did not respond to medical treatment. This right tension at the time of operation (after considerable medication) was 45 mm. (Schiötz). An operation similar to that on the left eye was performed. Atropine was used in both eyes for four weeks. During this time an objective refraction was done. Vision in the right eye with —4.00 D. sph. ⌯ —1.25 D. cyl. ax. 90° was finger counting at six feet; in the left eye with +1.50 D. sph. ⌯ +1.75 D. cyl. ax. 180° it was 0.4+1. The right disc was at all times normal. The right visual fields for 1 degree red and white showed a mild (10 degree) concentric contraction of the peripheral field. A relative central

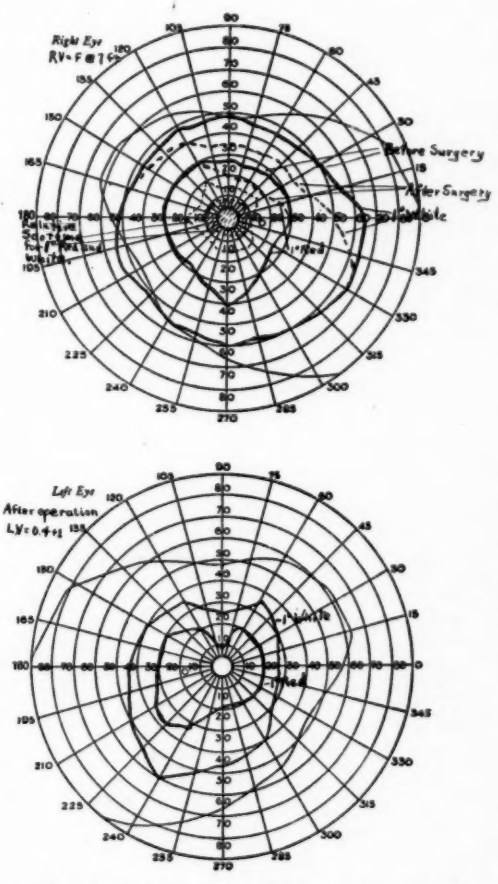

Fig. 1 (Abraham). Upper chart (right eye) shows the field before surgery (solid line) and after surgery (broken line). The lower chart (left eye) shows the field after the operation, when vision was 0.4+1.

scotoma was present. This was explained on the basis of the amblyopia with stabismus. The left disc showed a definite though incomplete cupping involving three fourths of the disc. The vessels were displaced nasally.

This case of acute glaucoma in an amblyopic eye is being placed on record not only to show that this can occur,

but to stimulate a search for such cases.

Acute glaucoma in which the inciting factors are more effective may more readily be expected to induce an attack in amblyopic eyes than the less severe chronic form of glaucoma.

The idea that primary glaucoma is initially due to a vascular crisis in which there is an excessive fluid inflow into the eyeball is given additional support by the case reported. Studies on the appearance of obstruction to outflow (Troncoso,[5] Werner[6]) suggest that the reaction in the iris angle follows the initial vascular disturbance and makes more permanent the imbalance between inflow and outflow of ocular fluids. That any condition of the eye which tends to prevent an increased blood flow to the eyes is to be considered a probable factor in the reduction of the incidence of primary glaucoma is self-evident. One would expect to find a lowered frequency of glaucoma in myopia. The literature on this contains conflicting reports (Gilbert,[7] Gala[8]). One of the latest reports (Gala[8]) on this subject, and one which apparently contains the largest series of glaucoma cases investigated for this purpose, showed that before operation there were only seven myopic patients in 438 cases of primary glaucoma or only 1.6 percent. The incidence of myopia in the age group concerned is considerably higher, over 15 percent (Tassman[9]). In a study of intraocular tension in anisometropia, Urio[10] found the tension to be lower in the higher myopias. According to Gala[8] the reverse is true in hyperopia, indicating, as Ferree and Rand[11] have also emphasized, that any condition tending to cause an increased blood flow to the eyes should be considered a probable contributory factor in the production of increased tension.

If data were available on the frequency of glaucoma in *uncorrected* myopia, the reports would probably show more clearly the influence of the factor of a normally or a subnormally functioning organ, particularly an active or inactive ciliary body.

Conclusions

1. A case of acute glaucoma in an amblyopic eye is presented. 2. It is suggested that subnormally functioning eyes tend to be less susceptible to primary glaucoma. This seems to be true for amblyopic eyes. 3. Relief from "eye strain," especially as it occurs in hyperopia, is particularly desirable in glaucomatous patients. 4. The relation of a disturbed inflow to the etiology of glaucoma is emphasized.

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Bibliography

[1] Abraham, S. V. Anterior chamber punctures, etc. Arch. of Ophth., 1932, v. 7, June, p. 888.
[2] Adler, F. H., and Landis, E. M. Studies on the protein content of the aqueous. Arch. of Ophth., 1925, v. 54, May, p. 265.
[3] Bothman, L. Personal communication on unpublished data.
[4] Gifford, H. Jour. Amer. Med. Assoc., 1916, v. 67, July 8, p. 112.
[5] Troncoso, M. U. Closure of the angle of the anterior chamber in glaucoma. Arch. of Ophth., 1935, v. 14, Oct., p. 557.
[6] Werner, S. Gonioscopy in primary glaucoma. Arch. of Ophth., 1932, v. 10, p. 112.
[7] Gilbert. Glaucoma in myopia. Arch. f. Ophth., 1912, v. 82, p. 391.
[8] Gala, A. Myopia and glaucoma. Oft. Sbornik, 1930, v. 5, p. 119; Amer. Jour. Ophth., 1931, v. 14, p. 385.
[9] Tassman. Frequency of refractive errors, etc. Amer. Jour. Ophth., 1932, v. 15, Nov., p. 1044.
[10] Urio, H. Myopic fundus degeneration in anisometropia, etc. Arch. of Ophth., 1933, v. 131, Dec., p. 377.
[11] Ferree, C. E. and Rand, G. Lighting and the hygiene of the eye. Arch. of Ophth., 1929, v. 2, July, p. 24.

THE ROLE OF PARACENTESIS IN OPHTHALMOLOGY

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Paracentesis receives but scant notice in ophthalmic literature. The operation itself is simple and minor, but the conditions in which it is used are serious and major. The role of the aqueous is briefly discussed. Conditions in which paracenteses are occasionally used to advantage are mentioned. Reference is made to bullous formations. A case is reported in which bullae and relapsing erosion of the cornea occurred following trauma and which was apparently brought to an end by repeated paracenteses. A proper evaluation of the therapeutic measures employed is difficult because so many were tried. In view of the recent work of A. L. Brown, the combination of parenteral injections of typhoid-para-typhoid and paracenteses may be deserving of the credit. Read before the St. Louis Opthalmic Society, January 24, 1936.

Medical literature both general and special contains many references to rare and unusual conditions and to methods of procedure or operation which find little practical use in every day practice. This is true of ophthalmology as well as of the other specialties. It is surprising to find that minor procedures or operations may be virtually ignored in medical reports. Possibly because they are minor, one hesitates to clutter up further an already overburdened bibliography. Paracentesis falls into this category. A search of the literature going back many years revealed but few and meager references. It is only the textbooks that have anything to say about this minor yet important operation.

The term is used in the broader sense to include both puncture of the anterior chamber and of the vitreous chamber. Though the operation itself is simple and minor, the conditions in which it is used are serious and major, such, for instance, as in embolus of the central artery and in secondary glaucoma.

Puncture of the cornea was introduced by McKenzie as a means of combating the increase of tension in glaucoma, but it was soon found to be of but temporary benefit and gave way completely to iridectomy as a curative measure. However, paracentesis has its place in glaucoma, when a transient effect only is desired simply to tide over a bad situation. It is then usually known by the more dignified terms of anterior or posterior sclerotomy. Sclerotomies in their essence are but amplified paracenteses.

It might be well, before detailing the conditions for which paracentesis may be employed with benefit, to give some consideration to the aqueous. In the normal eye the aqueous is formed by the epithelium of the ciliary processes by a process of selective filtration or transudation and is not a secretion in the true sense. It is a limpid, clear, watery fluid containing but a minimum of salt and albuminous matter. If any tissue depends on the aqueous for its nutrition, it must have a precarious existence. The total amount of aqueous is small and its rate of flow slow. The time consumed in a complete change of fluid in the anterior chamber requires about 45 minutes to an hour in the normal eye. As soon as the anterior chamber is artificially evacuated, the character of the aqueous changes and it then becomes so charged with albuminous matter that it may spontaneously coagulate, a thing which normal aqueous can never do. The salt content and the amount of antibodies also increase. This change in the nature of the aqueous may be decidedly advantageous in some instances and doubtfully so in others.

It is a matter of common clinical observation that when a corneal ulcer spontaneously perforates, the eye begins to recover. Why is this? A number of factors may be operative. The change for the better in the ulcer is so rapid and marked that it is not difficult to believe that a neutralizing element, namely, an antitoxin, has been at work. Perhaps the improvement is due to the temporary release of normal tension on the corneal lamellae, since the intraocular tension is for a while reduced to

zero. Or is the improvement the result of the ulcer's being bathed by a new and different aqueous, rich in salts, protein, and antibodies? All these conditions may play a part in healing but special consideration must be given the role of the altered aqueous. Chemical and bacterial irritants may change the character of the aqueous, as happens in the well-known reaction of the ciliary body to a foul corneal ulcer. Toxins from such an ulcer pass by osmosis into the eye and set up an irritation with a resulting engorgement of the ciliary vessels and the exudation of leucocytes.

When the anterior chamber is artificially or spontaneously emptied the turgescence of the ciliary vessels is very great, allowing the nutrient and bactericidal elements of the blood to pass the heretofore discriminating ciliary epithelium and enter into the formation of a much-altered aqueous. The release of tension on the corneal lamellae may have much to do in enabling the cornea to imbibe a greatly increased amount of nutrient lymph. On the other hand, increased tension would tend to consolidate the corneal lamellae and result in a restricted flow of interlamellar lymph. All are familiar with the leather-like toughness of the sclerocornea in chronic glaucomatous eyes. It is in these chronic-hypertension cases that nutritional disturbances are commonly encountered.

The cornea, being an avascular structure, depends for its nutrition in great part on the passage of lymph between its lamellae. This lymph originates from the vascular loops at the limbus. The diffusion of lymph plus the exudation of leucocytes occurs physiologically in the normal healing of corneal infections at an accelerated rate, but it is not fast nor complete enough to prevent widespread destruction of corneal tissue if the infection is virulent. The relaxation of the tension on the corneal lamellae, the result of a paracentesis or any incision of the cornea, would cause an engorgement of these limbal vascular loops and also mechanically make for a freer passage of nutrient lymph and hence a stimulus to repair. If spontaneous rupture is beneficial then, so far as repair is concerned, but detrimental as regards complications and sequelae such as prolapsed iris or cystoid scar, why not employ paracentesis in threatened rupture? This thought occurred to ophthalmologists many years ago, giving us the ordinary limbal puncture, and also the well-known Saemisch section. The limbal puncture was formerly performed much more frequently than at present, both for all types of threatening perforation and for many other unrelated conditions. The worst type of ulcer seems to have been reserved for the Saemisch section. Inasmuch as the section is made through the floor of the ulcer, the eye is exposed to the danger of iris prolapse and injury to the lens. A limbal incision while it does not cause so much nor so prolonged a relaxation of the corneal lamellae and does not allow the ulcer floor to be bathed by the leaking aqueous, yet obviates the dangers just related. One can always repeat a paracentesis. The reason one hesitates to do a paracentesis in an infected-ulcer case is the hazard of intraocular infection. The dangers inherent in a spontaneous rupture would appear to outweigh this hazard. The operation of delimiting keratotomy is but a modification and elaboration of paracentesis and the Saemisch section. The cut in delimiting keratotomy is made in sound tissue adjacent and tangential to the advancing border of the ulcer.

In addition to its application in cases of ulcer, paracentesis has been used as a therapeutic measure in a number of other conditions. Except in secondary glaucoma the occasion for its use does not frequently arise. The conditions may be enumerated as follows:

Embolus. In embolus of the central artery it may be tried if the case is seen early. Theoretically it should help. With the tension reduced to zero in front of the the embolus, the vis-a-tergo in the vessel might push it along to a branch of the artery. Unfortunately, many cases of so-called embolus are in reality instances of thrombosis. If used, something might be gained; nothing is lost if it does not work. In such a desperate condition anything that

offers any promise should be used.

Detachment of the retina. Puncture of the sclera, single or multiple, was used many years ago for detachment of the retina with a view to evacuating the subretinal fluid. The idea of producing a localized plastic chorioretinitis does not seem to have been a part of the procedure, as it is in our more recent operations.

Glaucoma. Paracentesis was originally used to reduce tension, but produced no lasting results, acting only as a palliative measure. Such effects are useful to a greater extent in secondary glaucoma. For permanent results paracentesis was superseded by iridectomy and types of filtering cicatrices. Increased tension at times accompanies iritis and other uveal inflammations; if uncontrolled by medicinal measures, paracentesis may be performed. Long-standing iritis that has yielded to nothing may necessitate the minor operation of paracentesis or the major one of iridectomy. The relief of symptoms from a swollen lens comes really under the heading of secondary glaucoma. Posterior scleral puncture is used to deepen the anterior chamber to make possible an iridectomy and also to lower the tension in an eye with very high tension in order to obviate the danger of an expulsive hemorrhage.

Keratectasia. In the beginning of this condition it may be combated with paracentesis and a pressure bandage. Keratectasia may follow pannus, parenchymatous keratitis, and ulcer. It is frequently accompanied or followed by increased tension. In all of these conditions paracentesis may find a place.

It is probable that the use of paracentesis in helping to clear up **vitreous opacities** and in **uveal inflammations** with normal tension was based on the effect produced on tissue metamorphosis, but just how this comes about is not quite clear. That the operation has an influence on tissue metamorphosis is beyond cavil. It is this latter effect which I wish to discuss in some detail as it bears on the case report which is to follow.

As it is possible and usual for drugs and toxins to pass from the exterior to the interior of the eye by osmosis, so likewise it may be possible for substances in solution to pass in the reverse direction. These may be noxious or nutrient. Nutritional or inervational disturbances bring about vesicular or bleb formation, the source of the fluid not being definitely known. The genesis of a number of the obscure keratitides may exist in a perversion of the aqueous, especially if accompanied by a disturbance of the endothelium of Descemet's membrane.

Irritants passing by osmosis or otherwise from the interior to the exterior might conceivably set up a disturbance in the anterior part of the cornea giving rise to superficial lesions. These might take the form of bleb formations with or without the loss of corneal epithelium. This is ventured purely as a hypothesis. The probable source of the fluid in ordinary vesicles and blebs is from the interlamellar lymph, the bleb formation coming about in some manner associated with trophic disturbance. Bleb formation may be summed up as dependent on two factors: namely, (1) abnormal conditions of lymph constitution or lymph circulation, and (2) some abnormality of innervation. It is thought by some that deficient nerve power is the cause of ulceration following vescile formation and relapsing erosion of the cornea.

One of the functions of the endothelium of Descemet's membrane and of the corneal epithelium is that of waterproofing. Were this not the case the cornea would swell and cease to be clear because of the imbibition of water. In cases of bleb formation in eyes which have come to anatomical investigation (usually glaucomatous) it is a common, or, one may say, usual occurrence to find the endothelium altered. This being the case, weight is given to the hypothesis that noxious or other elements might enter the cornea from the anterior chamber and influence its nutrition, especially that part of it which is concerned with bleb formation; namely, the corneal epithelium and Bowman's membrane. It seems quite probable that a different explanation must exist for the formation of bullae

following glaucomatous and degenerative conditions and those cases in which no such history is present. It is only the former class of cases that come to anatomical investigation.

It is a case of formation of bullae accompanying a relapsing erosion of the cornea, the result of trauma, which I wish to report briefly. The case report is as notable for the measures that did not help as for those that did. Final credit was given to repeated paracenteses (6). Fuchs has stated that recurrences of vesicles and bullae can at times be stopped only by iridectomy. The lesser and nondeforming operation of paracentesis was tried. The explanation for the beneficial action of paracentesis was that tissue metamorphosis was in some way affected, possibly from a lowering of the intraocular tension and the removal of the stress on the corneal lamellae. There is a possibility also that a change in the nature of the aqueous had some bearing.

Case report

Mr. P. S., aged 43 years, was injured March 17, 1934, by being struck in the right eye with a piece of bread. He was treated for a week by his family physician with no improvement. The pain was very severe when he was seen on March 25, 1934. The edges of the abrasion were thickened and soggy looking. Treatment consisted of atropia, xeroform in oil, infrared light, and holocaine ointment, followed in succession by typhoid vaccine intravenously (4 injections). This seemed to help for a while, but on April 7 there was a relapse with denudation of a large area of the cornea. Atropine was stopped, as the eye felt hard, and 1-percent optochin substituted. Codeine and pyramidon were taken for pain. The lids were puffy. The tension was 28 mm. Hg on April 13th. The patient had some nasal polyps and their removal was advised. At home, pantocaine, 1 percent, had been used regularly, but was insufficient to keep down the pain. On April 18th, hyoscine, 0.25 percent, was used. A Wassermann test was ordered. On April 23d there was a large bleb taking in the lower half of the cornea; a dependent sac filled with fluid. This was punctured and it flattened out. On April 25th, the epithelial layer all over the cornea was loose and was lifted off with forceps. There was a slight bleeding from the limbal loops. The cornea was dried and 15-percent trichloracetic acid was applied over the whole denuded area. The patient did well following this until April 30th. Again the epithelium was removed and the cornea touched with 15-percent trichloracetic acid. On May 1st the nasal polyps were removed. The next day a small denuded area was touched with 3½ percent tincture of iodine. On May 7th the epithelium was soggy and loose and was removed from the whole cornea, to which 3½-percent tincture of iodine was applied. The pain and reaction were most severe.

At the height of the trouble a number of exposures to ultraviolet light had been given with apparently no results. Chromium sulphate internally had been given at home.

On May 11th the first paracentesis was performed. This was followed by five other paracenteses, the last on May 28th. Following the first puncture the improvement in the ocular condition began. Atropine was continued as long as the eye was red and irritable. On June 29th the eye was white and quiet and had shown no staining since May 29th. The haziness of the cornea gradually disappeared and on August 24th the vision was 6/6—1 with —0.37 D. cyl. ax. 90°. From then until November 27th, a period of three months, a gradual change took place in the curvature of the cornea associated with a clearing of the opacity. The final refraction was: O.D. —1.00 D. sph. ⊂⊃ +2.00 D. cyl. ax. 180°. With this correction vision was 6/6. The patient has been seen at intervals since that time but has had no return of symptoms and no further change in refraction.

To Dr. Mason I wish to acknowledge my appreciation for his suggestion of the use of 15-percent trichloracetic acid and of paracentesis.

Note: Since the above was written

a paper was read at the Kansas City meeting of the American Medical Association (May, 1936) by Dr. Albert L. Brown of Cincinnati in which the results in corneal ulcer were reported. The treatment consisted essentially of parenteral injections of typhoid-paratyphoid combined with paracentesis. Of decided interest was the statement that the effects of typhoid injections persisted for as long as 200 days. That the combined action of typhoid injections and paracentesis may have been the beneficent factor in the case just reported must be given consideration.

Humboldt Building.

UNILATERAL CONGENITAL ANOPHTHALMOS WITH ORBITOPALPEBRAL CYST

MORRIS ROSENBAUM
NEW YORK

The author asserts that eye defects, while they may be due to vitamin deficiencies, may also be caused by transmission from one generation to another as a result of deficiency in the chromosomes. These deficiencies bring about inhibition of embryonic growth during early development. Read before the Ophthalmological Section, Mt. Sinai Hospital, April 2, 1936.

In June, 1931, in the Archives of Ophthalmology, the writer reported a case of bilateral anophthalmos.[1] Since then, he has come across another case of anophthalmos, a unilateral malformation with an orbitopalpebral cyst in the lower lid of the left eye, and this time was successful in removing the cyst with the globe. The case is herewith presented together with the microscopic examination of the specimen.

I. B., a boy aged 7 years, came to the New York Eye and Ear Infirmary, to the clinic of Dr. Key. The child, the third of a family of six children, was born at the Israel Zion Hospital, in Brooklyn, with only one eye. The parents are Polish Jews, not related to each other. The father denied any venereal history. The Wassermann reaction of both child and father was negative. As far as the father knew, no other similar case had occurred in his family.

The child had a perfectly normal right eye. When the lids of the left eye were separated, a cavity was visible with a small blue speck at its apex, probably the rudimentary cornea. A small cystic mass was found underneath the lower lid of the left eye.

On April 25, 1933, the rudimentary globe was removed under general anesthesia, and the specimen referred to Dr. Joseph Levine, whose report follows:

Pathological Report: Throughout the specimen there was no completely developed layer of the globe. Many areas of chromatophores were present and interspersed in these areas were irregularly shaped, calcified patches in some of which true bone cells appeared. In other areas the calcified masses were round and resembled psammomata. Most of the tissue was connective tissue with some fat globules scattered here and there.

Rudimentary formations of the retinal layers were present but nowhere rods or cones. In one area there were several groups of cells which appeared to be nests of epithelial cells and were possibly the "anlage" of the cornea. No cyst formations were found. In one portion there were many blood vessels but in other areas these were extremely scanty. Diagnosis: Rudimentary eyeball.

An X-ray film of the head and of the optic foramina showed that the frontals were exceedingly rudimentary. The orbit on the left side was slightly smaller than that on the right side. The optic foramen on the right side was normal, the left considerably contracted and irregular. The sella turcica was normal and of infantile type. True anophthalmos without some vestige of globe, is very rare; many cases with

Fig. 1 (Rosenbaum). I. B. at the age of seven years.

Fig. 2 (Rosenbaum). Sketch of wax impression of socket.

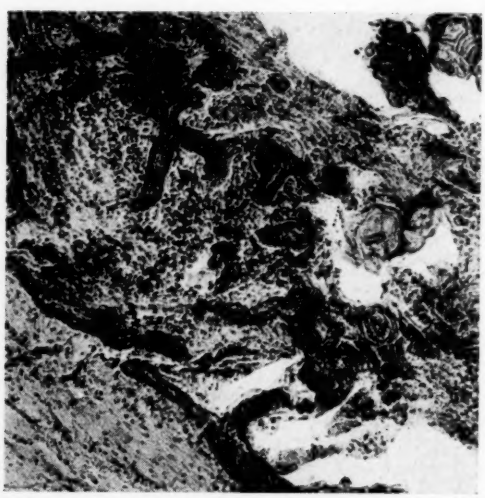

Fig. 3 (Rosenbaum). Section through rudimentary globe, low power, showing bone deposits.

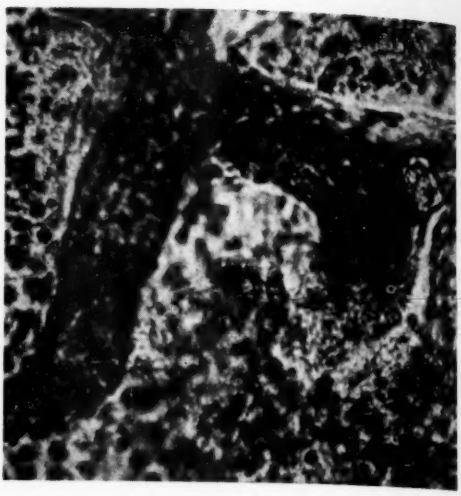

Fig. 4 (Rosenbaum). Section through rudimentary globe, high power, showing bone deposits.

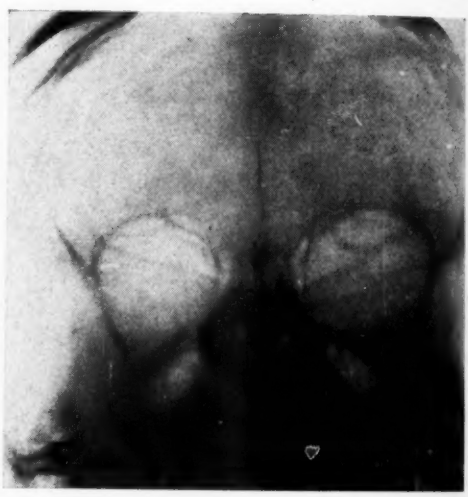

Fig. 5 (Rosenbaum). Roentgenograph of skull, showing unequal size of orbits; the left smaller than the right.

cyst formation, however, have been reported. According to the literature, the left eye is more often affected than the right, when the defect is unilateral. In about one half of the cases reported the other eye had some developmental defect, such as coloboma In my case, no malformation was present in the right eye.

Those authors who have had the

good fortune to examine the cyst microscopically, for the most part found "Retina perversa," although others reported glial formation. The cause is believed to be due to extreme ectasia, occurring in the defectively closed fetal cleft.

Nathanson[2] stated that there are two groups: one, a true microphthalmos; the other, a rudimentary globe; both with cyst formation. In his opinion the cause is not clear, only one thing being certain; namely, that there has been no inflammatory process.

In cases of microphthalmos in which the eye was very rudimentary, there has almost always been an adjoining cyst; but many times the cyst was missed during enucleation, for the wall is so thin that it may be incised and the fluid escapes, leaving a shrunken shell after fixation. This is what probably happened in my case, for no vestige of cyst was visible microscopically.

Much experimental work has been done by Guyer and Smith[3] and by Landauer,[4] on the creeper fowl. These men tried inbreeding and cross breeding to determine whether any hereditary cause exists that might lead to the maldevelopment.

Landauer stated that dominant genes with recessive lethal action in several organisms have often been found associated with chromosomal changes, such as section deficiencies, deficiency of a whole chromosome, translocation, and so on. It has been shown that the first deviation from normal development that can be found in homozygous embryos is a general inhibition of body growth; this retardation of growth only secondarily seems to bring about the various malformations that are found in late developments.

Fred Hale[5] described experimental work on the breeding of pigs by a vitamin-A deficiency. Nevertheless, the heredity principle due to recessive factors from heterozygotes must be taken into consideration. Of course, according to his experiments, absence of vitamin A is a cause, but it does not exclude the lack of other vitamins nor combinations of vitamins which may also be a cause.

Other experimenters injected toxic substances into chick eggs, or mutilated them, and succeeded in obtaining chicks with undeveloped eyes, or no eyes at all. X rays were also tried and similar malformations resulted.

It is possible that a point mutation in the genes might have a general retarding effect on growth, but it is more likely that a section deficiency in the chromosomes is responsible for the defects. The maldevelopment, therefore, may be looked upon as a germ variation. This, of course, may also be parasitic or toxic.

Hess[6] concluded that inflammatory processes do not play the chief role in the causation of abnormalities, as was formerly believed.

Ochi[7] found in his experiment on the chick, the proportion of microphthalmos to anophthalmos as three to two, and concluded that at the beginning of development, any factor, chemical or physical, which can disturb the normal condition of the blastoderm, in its circumference, may bring about an abnormal differentiation of the embryo. If the disturbance is great, total arrest of development occurs; otherwise, partial. Any chemical or physical injury, sufficient to disturb the normal condition of the blastoderm, may result in embryonic deformities.

As to the cyst formation, all the cysts are the result of ectasia due to coloboma of the retina, choroid or sclera, to any one or all three, and these cysts may communicate with the vitreous or may be subretinal. There have been cases in which retina and choroid were undeveloped and the cyst wall consisted of sclera only.

Causes other than toxic may be hemorrhages, sudden pressure, possibly amniotic strands, and vitamin deficiencies. A spontaneous coloboma may occur without toxins. Whether qualitative hereditary changes can take place in the chromosomes, has not yet been ascertained. When at the development of a gene, one has a chromosome in excess, and the other a chromosome less, a defect may occur; either a propulsive pithecoid or recessive shrunken fetal condition.

A glance at the literature shows that the maldevelopment of the eye is associated with other maldevelopments of the body, such as of the extremities, and of other portions of the head, giving the picture of phocomelus. It is possible that in the union of the heterozygotes, the inherent cause of maldevelopment exists. The amount of abnormality in the chromosomes may be various, resulting in more or less of deformity. The smallest amount of section deficiency in a chromosome may have a lethal effect on mutation. It certainly is different from atavism.

Conclusion

Every idiogenetic malformation has its ontogenetic characteristics, which are inherent in its gammetes. It is important to note that such embryonal end result is not pathological, but only differentiated, as a result of arrest of development.

61 West Eighty-eighth Street.

References

[1] Rosenbaum, M. Congenital anophthalmos with orbitopalpebral cyst. Arch. of Ophth., 1931, v. 5, June, pp. 884-889.
[2] Nathanson, L. Arch. f. Ophth., 1908, v. 67.
[3] Guyer, M. F., and Smith, E. A. Studies in cytolysins. Jour. Exper. Zool., 1918, May, pp. 65-82.
———. Studies in cytolysins. II. Transmission of induced eye defects. Jour. Exper. Zool., 1920, v. 31, p. 171.
[4] Landauer, W. Ueber die entwicklungsmechanischen und genetischen Ursachen des Coloboms und anderer embryonalen Augenmissbildungen. Arch. f. Ophth., 1932, v. 129, pp. 268-273.
———. Studies on the creeper fowl. Jour. Genet., 1932, v. 26, pp. 285-290.
———. Studies on the creeper fowl. Jour. Genet., 1931-1932, v. 25, pp. 367-393.
———. Jahrb. f. Morph. und mikros. Anat., 1933, v. 32, pp. 359-411.
[5] Hale, F. Amer. Jour. Ophth., 1935, v. 18, Dec., pp. 1087-1092.
[6] Hess, C. Beiträge zur Kentniss der pathologischen Anatomie der angeborenen Missbildungen des Auges. Arch. f. Ophth., 1892, v. 38, pt. 3, p. 93.
[7] Ochi. Experimental study of histogenesis of eye abnormalities in the chick embryo. Brit. Jour. Ophth., 1919, Oct. pp. 433-443.

NOTES, CASES, INSTRUMENTS

DIATHERMY IN CATARACT EXTRACTION

THEODORE L. TERRY, M.D.*
BOSTON

A secure grip on the lens and its capsule would greatly simplify the process of intracapsular cataract extraction and reduce the hazards of the operation. A very secure grip can be obtained on the lens by means of diathermy coagulation. The reports of Lacarrère,[1] Moreu,[2] and others led me to investigate the method.

Two theoretical questions arose: 1. Can the passage of an electric current between two electrodes, one within and one outside of the eye, cause glaucoma or hypotony by producing disturbance of the pH and chemical balance between the tissues and the blood stream? 2. Can the passage of an electric current between two electrodes, one within the eye and one outside the eye, injure the retina so as to destroy vision? In one case Walker[3] feels this may have been the cause of destruction of macular vision in an operation for separation of the retina.

By means of eyes of laboratory animals and enucleated human eyes an electrodiaphaque somewhat similar to that of Moreu was used in an attempt to develop a satisfactory operative technique. It was found that a surprisingly firm grip on the lens could be secured. In brief, my modifications of the Lacarrère-Moreu technique were: 1. Corneal section of two fifths instead of three fifths of the corneal circumference. 2. Electrode applied to the lens well above the anterior pole after iridectomy. 3. Lens not tumbled. 4. Electrodiaphaque so constructed that the wire from the diathermy unit can be detached after the current is switched off, so as to facilitate manipulation of the instrument in delivery of the lens. 5. Moderate counterpressure used below. 6. It was found most satisfactory to turn on only a small amount of current (the amount usually used in Safar operation)** to permit the insertion of the electrode tips to their full depth, then to increase the current to produce sufficient coagulation around the electrode points.

When this modified technique was used for cataract extraction, the lens was satisfactorily removed without immediate complication in six cases. The later disastrous results in two cases and occurrence of glaucoma in two other of these cases induced me to abandon the method. Moreover, it does not seem to me that the possible advantages of diathermy extraction warrant the risk of further operations of this type on patients.

Two of the patients developed peculiar deep, dense, vascularized infiltrations of the entire upper half of the cornea of the eye that was operated on. The earliest appearance of the opacity was three days after the cataract extractions. In one of the cases in which glaucoma developed vision was lost in spite of decompression but in the other case the glaucoma was relieved by trephining.

I have no satisfactory explanation for these complications. It does not seem possible that my small modification of the technique of Lacarrère or Moreu could account for this. The electrode or the glass insulation which made up the handle did not come into contact with any tissue other than the lens during the entire operation.

Since this was written a paper by Khalil[4] appeared in which the author stated that, "one of the cases had keratitis for some time after the operation, probably through overdosage."

243 Charles Street.

* From the Massachusetts Eye and Ear Infirmary and Harvard Medical School.

** To give the amount of current in M.A. would be less specific because of variation in types of diathermy units in use.

References

[1] Lacarrère. Arch. de Oft. Hisp.-Amer., 1932, v. 32, p. 293.
[2] Moreu. Amer. Jour. Ophth., 1935, v. 18, p. 739.
[3] Walker. Trans. Sect. Ophth., Amer. Med. Assoc., 1934, p. 35.
[4] Khalil. Brit. Jour. Ophth., 1936, v. 20, no. 3, p. 167.

APPARENT INCREASE OF HYPEROPIA UP TO THE AGE OF NINE YEARS*

E. V. L. Brown, M.D.
CHICAGO

It has been very generally held that all eyes are hyperopic at birth and gradually lose some of this hyperopia or become myopic in the pre-school and early school years. One group has held that there is a marked tendency to "emmetropization" during this developmental period. In a paper by Kronfeld and myself in 1929,** this view, that decrease of hyperopia is the rule, was brought into question. The number of cases then at hand was relatively small (110) and data now at hand permit of a more critical study of the subject. The material now consists of 604 eyes, each of which had its refraction determined under atropine cycloplegia upon two or more occasions, one or more years apart, before the ninth year of age.

Briefly, the study of the group as a whole shows that 63 percent of such eyes have not become less hyperopic but more hyperopic; 29 percent, only, were found to have any decrease of their hyperopia; 8 percent showed no change.

But as every one knows by far the greater number of children brought to the eye doctor in their earlier years come because of strabismus, and when this series is analyzed in this way another picture is found. Strabismus was found in 445 or 74 percent of my cases and 69 percent of these showed an increase of hyperopia between the two examinations; only 24 percent became less hyperopic; 7 percent stood still. In the 159 nonstrabismic eyes, however, only 47 percent showed increase of hyperopia; 42 percent showed less hyperopia and 11 percent stood still. The average period of observation for the children with strabismus was 2.6 years and the average increase per year for those that did increase their hyperopia was 0.41 D.; the average change for those who showed decrease was 0.24 D. per year; 7 percent showed no change. The average period of observation for the eyes without strabismus was two years and the increase of hyperopia, among the 47 percent who showed increase, was 0.33 D. per year; for the nonstrabismic eyes that showed decrease of hyperopia the average change was 0.37 D. per year.

Comment

The number of cases without strabismus is too small for definite conclusions (159 eyes) but as far as it goes it does not support the generally accepted view that eyes become less hyperopic in the pre-school and early school years, for nearly half of the eyes studied by the writer (47 percent) became more hyperopic. More material is needed.

The 445 strabismic eyes, however, constitute a real challenge to the view that all or most eyes become less hyperopic in early childhood, for 69 percent of them were found to be more hyperopic.

Summary

At a second or subsequent examination under atropine cycloplegia one or more years after a first examination, 69 percent of 445 eyes of strabismic children under the age of nine years showed more hyperopia.

Forty-seven percent of 159 nonstrabismic eyes in the same age group also showed an increase of hyperopia at a second examination. The number of nonstrabismic eyes is too small upon which to base a final conclusion but each group and the combined groups constitute a challenge to the generally accepted view that children's eyes, hyperopic at birth, regularly become less so in the pre-school and early school years.

950 East 59th Street.

* Read before the Chicago Ophthalmological Society, March 16, 1936.

** Brown, E. V. L., and Kronfeld, P. C. The refraction curve in the U.S.A. with special reference to changes in the first two decades. Compte-Rendu du XIII Concilium Ophthalmologicum. Amsterdam, Den Haag, September, 1929.

CASE OF MARKED EXOTROPIA TREATED WITH STRONG CONCAVE LENSES*

Maurice L. Greene
SAINT LOUIS

Use of strong overcorrection of myopia is certain to be criticised by many.

* Read before the Saint Louis Ophthalmic Society, March, 1936.

Textbooks make the dogmatic statement that all cases of myopia are to be corrected by the weakest minus lens with which the patient sees best. Parsons, in his last edition, published in 1934, says, that every surgeon agrees that myopia must never be overcorrected and advised a slight undercorrection in most cases. The same author in speaking of divergent strabismus seems to agree with Donders's observations regarding the relationship between poor convergence power and divergent strabismus and states that in divergent strabismus slight overcorrection is indicated.

DeSchweinitz states that in divergent strabismus a full correction of myopia should be made, but does not advocate an overcorrection. He does, however, overcorrect the hypermetropia in convergent strabismus. He further states that in exotropia associated with hyperopia, the latter may be undercorrected.

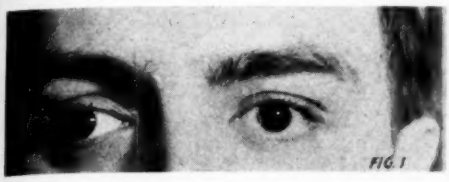

Fig. 1 (Greene). Position of the eye before glasses were ordered.
Fig. 2 (Greene). Position of the eye after overcorrection had been worn for one year.

In the opinion of W. T. Davis moderate overcorrection of myopia in divergent strabismus may be desirable as a temporary measure.

Most of the authors in discussing orthoptic training refer to the refraction in these cases merely by saying that the patient was given their best correction so that apparently the practice of overcorrection of myopia in cases of divergent strabismus is not generally followed and is actually condemned by many. Yet why should the myopia not be overcorrected in an effort to stimulate accommodation and thus produce a tendency to convergence?

Overcorrection of hyperopia leads to a tendency to divergence, due to the state of artificial myopia produced, and, unquestionably in many of these cases, if an overcorrection is maintained for any great length of time, a weakness of adduction develops which is detrimental to the patient in later life, particularly when he reaches the presbyopic stage. Overcorrection of myopia, however, has the exact opposite effect in that it stimulates accommodation by making the patient artificially hyperopic. It is generally recognized that patients with myopia develop a tendency to divergence due to poor convergence power, so that it seems only logical that some attempt should be made to increase the convergence power. Repeated efforts of accommodation increase the adductive power and make fusion easier.

The following case serves to illustrate what can be accomplished by this type of treatment:

A. F., a white male, aged 21 years, a university student, was first seen in March, 1934, his chief complaint being impaired vision. The patient was very much concerned about a divergent strabismus of the right eye which was almost constant. This divergence had been first noticed when he was about 10 years of age. Glasses had never been worn. With the stereoscope he did not have simultaneous binocular vision. The vision in the right eye was 20/50 and in the left eye 20/40. The divergence measured about 35 degrees. It was impossible to obtain measurements of duction, for the right eye would immediately diverge and the patient would have single vision when a prism was placed over either eye.

Under atropine the refraction was: O.D. —1.50 D.sph.; O.S. —1.25 D.sph.; and with this correction vision was 20/15 with each eye.

The position of the eyes, however, was unimproved after wearing this for

several hours, but with a strong minus addition there was a definite improvement in position.

Glasses were ordered: O.D. —2.50 D.sph.; O.S. —3.0 D.sph. With this correction the patient's vision was still 20/15 right and left, but there was only a slight amount of divergence—5 to 10 degrees being present. These glasses were worn with complete comfort for six months, but the right eye gradually became more and more divergent and in September, 1934, new lenses were prescribed: O.D. and O.S. —4.50 D.sph.

Despite the fact that the patient was overcorrected about three diopters right and left, his vision was only slightly blurred, being 20/20 in each eye.

After wearing this correction several weeks the tendency to divergence had entirely disappeared. With the stereoscope he had good simultaneous binocular vision, but fusion was still faulty. He remained comfortable with this correction throughout the entire school year and the position was excellent—only rarely was there any tendency to divergence.

One year from the date on which the strong overcorrection had been made, he still had excellent position and no discomfort. O.D. and O.S. vision was 20/20 minus, with good simultaneous binocular vision and fusion at times. At this time he was given orthoptic training with the Wells and Guibor charts and the stereoscope. He was seen once a week in the office and used the stereoscope 20 minutes morning and evening at home. After five months of this training he had excellent position; with the Maddox rod he had no hyperphoria and but one degree of esophoria and he had developed excellent fusion and depth perception.

He complained somewhat of discomfort after doing near work with the strong correction; accordingly, the strength of the minus spheres was reduced to —3.50 D. This correction was worn for about six weeks with no further discomfort and no change in the tendency to divergence. Several weeks ago the spheres were further reduced to —2.50 D. right and left, but at times the right eye shows a tendency to diverge again. It may be necessary again to add the stronger correction. He has had no appreciable increase in his myopia, as with O.D. —1.75 D.sph. and O.S. —1.50 D.sph. his vision is 20/15 minus.

It is still difficult to measure the duction power, but adduction is certainly much stronger than it was before he began wearing the strong concave lenses. Adduction equals about 4-5 dedegrees, but measurements are very uncertain as are the measurements of the convergence near point. Convergence, of course, is at times still deficient, but for the greater part of the time his convergence near point is quite normal.

He has a slight amount of right hyperphoria (1-2 degrees) at 20 feet, and an esophoria of 1-2 degrees for near with the Maddox rod, and about the same amount at 20 feet.

706 Missouri Building.

ANNOUNCEMENT

We wish to call the attention of our subscribers to a change in format of the Journal beginning with the January number, the purpose of which will be to produce an improved magazine. More space has been placed between the lines and more pages added. A better quality of paper will be used which should not only facilitate reading but also lend itself to finer reproduction of illustrations. Numerous other changes will be made.

Beginning with the January issue we shall publish the first of a series of six lectures by Col. Robert E. Wright of Madras, India, on cataract and glaucoma. These lectures were presented to the students of the Los Angeles Midwinter Course of 1936. Any man who has performed more than twenty thousand cataract extractions and a proportionate number of glaucoma operations can certainly speak with authority in pointing out elements in the operations for these conditions which merit serious consideration.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on Ophthalmology

February 20, 1936

Dr. Charles R. Heed, chairman

A one-meter perimeter

Dr. Alfred Cowen read a paper on this subject which was published in the Journal (November, 1936).

Treatment of detachment of the retina by sclerotomy and the application of the thermophore

Dr. H. Maxwell Langdon said that in November, 1934, a case was reported by the writer, in which a partial detachment of the retina had been successfully treated by sclerotomy and multiple applications, for one minute each, of Shahan's thermophore, at a temperature of 165 degrees.

On November 18, 1935, a patient with detachment of the entire lower half of the retina, in which no tear could be discovered, was operated on in a similar way. The first symptoms had appeared about four months before the operation and the condition was diagnosed as retinal detachment two months before operation. There was complete reattachment of the retina with restoration of the form field, a 15-degree field for red and a corrected central vision of 5/22.

A third patient with detachment of the upper portion of the retina has since been operated on with apparently a good result. This case will be reported in detail later.

Discussion. Dr. Francis Heed Adler said that it is interesting that the external application of heat was one of the first methods employed to produce experimental detachment of the retina. The application of heat produces a serous effusion which will lift off the retina. If one is going to treat retinal detachments by this means it is of the utmost importance to create an outlet for this fluid.

Experimental studies on choked discs

Drs. William A. Jeffers, J. Q. Griffith, W. E. Fry, and A. G. Fewell concluded that: 1. Following the intracisternal injection of kaolin, the albino rat will develop high blood pressure associated with increased intracranial tension, but there will be no retinal venous engorgement nor choked disc. 2. The failure of thorotrast to enter the cervical lymphatics and the epidural connective tissue of the optic nerve of such hypertensive rats suggests that there is obstruction to the usual outflow of cerebrospinal fluid. 3. Kaolin-hypertensive animals do not develop the usual retinal venous engorgement of choked disc upon the implantation of cerebellar tumors. This suggests that the aforementioned block produced by kaolin may be the responsible factor. 4. The exact site of the obstruction to lymphatic flow has not yet been ascertained, but it is probably in the perivascular spaces of the lamina cribrosa and the adjacent dural region. 5. When thorotrast is injected into the cisterne of a normal animal, after the withdrawal of an equivalent amount of cerebrospinal fluid, it will lodge in greatest concentration just central to the lamina cribrosa, and inside the intervaginal sheath. This is evidence that fluid normally flows from the region of the brain toward the eye, and not vice versa. 6. The fact that thorotrast does not collect around the peripheral end of the optic nerve in the kaolin-hypertensive animal suggests that the usual anterior current of lymphatic flow is obstructed.

Discussion. Dr. Francis Heed Adler said that in 1924 Parker showed that the degree of swelling of the disc depended somewhat on the intraocular pressure, as the swelling was always greater on the side in which the intraocular tension had been reduced by an Elliot trephining operation. He had at present a patient under observation who demonstrates that this is not only true of choked disc due to raised intra-

cranial pressure but also to the swelling produced in hypertensive neuroretinitis. This patient was operated on four years ago for chronic simple glaucoma. An Elliot trephining was performed on the right eye. The tension in this eye has remained subnormal. Within the last year he has developed an arteriosclerotic retinitis in both eyes but the right disc is swollen about a diopter and a half whereas there is no swelling of the left disc. All of the veins are much more dilated on the right side and there are many more hemorrhages than on the left.

It is unfortunate that the authors have to use such small animals in their studies on choked disc, for it might be interesting to note whether reducing the tension in one eye of the experimental animal might not be effective in producing choked disc.

William Porterfield, an almost forgotten optic physiologist

Dr. Burton Chance read a brief account of William Porterfield and his works on the eye, published in Edinburgh about the middle of the eighteenth century.

Extraction of nonmagnetic intraocular foreign bodies (report of three cases)

Dr. James S. Shipman said that the first and the last cases are very similar, both patients having received their injury while working with fine copper wire on coil winding machines. The second patient was injured by a dynamite-cap explosion. All three patients were operated on by means of a posterior sclerotomy through the lips of which a small capsule forceps was inserted, and while looking with the ophthalmoscope through the pupil the operator was able to grasp the foreign body in the vitreous and extract it through the posterior sclerotomy opening. In the first case the sclerotomy wound was closed with interrupted black episcleral sutures, and in the last two cases the sclerotomy wound was first closed with the actual cautery.

The first patient made an uneventful recovery and for five weeks following the operation the vision was normal, but at the end of this time a retinal detachment was noticed. This became more marked and approximately two months after the original accident the first retinal-detachment operation was performed with Weve needles. This was unsuccessful and two more retinal-detachment operations were performed; in the last Safar needles were used. No permanent success followed any of the retinal-detachment operations. Three years following the patient's injury, examination showed a complicated cataract with divergence of the injured eye and only bare light perception.

The second patient made an uneventful recovery, and in spite of the fact that he had a partial posterior cortical cataract from the time he was first seen he still has useful vision, 6/15 with correction, two years after his injury. There was no evidence of any retinal detachment at any time and the visual field in this eye is full. The cataractous changes have remained practically the same.

The third case is a more recent one, the patient having been injured in November, 1935. More reaction was experienced following operation in this case than in the other two cases, and the partial cataract which was present at the time of the first examination became complete following operation, necessitating a linear extraction. Following the cataract extraction the patient made an uneventful recovery. At the present time the eye is quiet and with a plus 13.00 D. sphere the vision is 6/6—. The visual field is practically full and there is no ophthalmoscopic evidence of any retinal detachment.

Discussion. Dr. Alfred Cowan said that a foreign body, as seen in the vitreous with the ophthalmoscope, will appear by refraction to be farther forward than it actually is. This can be seen easily when a diagram is drawn to show how the rays, on leaving the eye, are bent toward the perpendicular. The foreign body will always be projected along the emergent ray. Roughly it will appear to be 25 percent nearer to the front of the eye than it actually is.

A. G. Fewell,
Clerk.

MINNESOTA ACADEMY OF OPHTALMOLOGY AND OTOLARYNGOLOGY

Section on Ophthalmology

February 14, 1936

Dr. H. F. Binger, president

Gunshot wound of orbit

Dr. Archie D. McCannel (Minot, N.D.) reported the following case of an unusual injury to the eye. The patient, Miss S., aged 21 years, a school teacher, was shot by a disgruntled suitor with a .22 caliber rifle. The rifle was six feet from the patient's face when it was fired. The bullet entered the outer angle of the orbit, passing about 2 cm. external to and 1 cm. below the outer canthus, fracturing the lower rim of the orbit, passing through the orbit, through the lower portion of the ethmoid and sphenoid bones and, entering the postnasal space, was evidently swallowed. X-ray films of the abdomen showed a portion of the lead bullet in the upper right abdominal quadrant. It was recovered on the fifth day. There was profuse bleeding at the time from the mouth and nose. The course of the bullet could be determined by X ray.

Examination of the eye showed a dilated pupil. Otherwise, the eye looked normal externally, except for swelling of the lids. The fundus showed a number of small retinal hemorrhages involving the lower half, the largest one being in the inferior temporal quadrant. Vision was reduced to the ability to detect hand movements in the lower temporal field.

The canal of Schlemm and its anastomoses

Dr. Georgiana Dvorak Theobald, of Chicago, said that there are four plexuses composed of arteries and veins: (1) the conjunctival; (2) the episcleral; (3) the scleral; and (4) the deep intrascleral. Each plexus is distinct but anastomoses not too freely with each of the others.

The canal of Schlemm is a lymphatic channel, plexiform and varicose, which lies deep in the scleral limbus; it is separated from the anterior chamber by the trabeculae corneo-sclerale (pectinate ligament); from its inner surface many small canals leave at right angles and connect with the spaces between the trabeculae. These were first described by Sondermann in 1933. They establish direct communication with the anterior chamber. From the outer surface of the canal of Schlemm emerge large collector tubes which connect with the deep intrascleral plexus. This deep intrascleral plexus should be considered as a lymphatic, but more work must be done on this question. The collector trunks are irregularly placed—in the eye demonstrated there were 29.

Discussion. Dr. Walter Fink (Minneapolis) asked if Descemet's membrane continued into the trabeculae and if there were a direct communication between the anterior chamber and the canal of Schlemm. Dr. Theobald said that aqueous enters the spaces between the trabeculae and through the inner canals of Sondermann, and directly flows into the canal of Schlemm.

Dr. Theobald said, in answer to Dr. George McGeary, that both the canal and the veins in the limbus are lined with a single layer of endothelial cells which lie in the sclera with no intervening connective tissue. Retzius likened the canal of Schlemm to the dura mater because it remains open, even when empty.

W. E. Camp,
Secretary

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

March 17, 1936

Dr. James J. Regan, presiding

Corneal dystrophy

Dr. Trygve Gundersen reported two cases on this subject. The first was referred to the Howe Laboratory by Dr. William D. Rowland from the Massachusetts Memorial Hospitals. The patient presented diffuse corneal haze; epithelium perfectly smooth; pupils active; no signs of previous inflammation. The tension was 11 mm. Hg in each eye. Vision in each eye was 20/200. The

blood test was normal and medically nothing could be found to account for the condition. A biopsy was taken, sections of which were not ready. A few days later at the Perkins Institute for the Blind, Dr. Gundersen found a 10-year-old boy with exactly the same condition but not so severe. He was also studied in the same manner and very little pathology was found. The patient was presented to demonstrate the condition. Dr. Gundersen said it was impossible to classify this disease although he thought it was very closely associated with nodular keratitis.

Sarcoma of the iris

Dr. William P. Beetham presented a lady who had been seen by him two years previously. The elevated nodule in the iris was carefully examined, measured with a scale in the ocular of the corneal microscope and drawn on the record. The patient was asked to return in two months. She was not seen again until one month ago when the nodule again attracted attention. It did not really appear much larger, but seemed to have a much more irregular contour than when first seen. Dr. Beetham considered the possibility of a sarcoma or a congenital thickening of the iris. Dr. Frederick E. Verhoeff had favored the diagnosis of sarcoma and because of the favorable circumstances had advised removal by iridectomy. The visual acuity was 6/6; the lesion was nonpigmented; transillumination was of no value. With the slitlamp could be seen what appeared to be normal iris stroma pushed forward by tissue beneath it.

Dr. Beetham said there are two types of sarcoma of the iris, pigmented and nonpigmented. In the pigmented type there is a nodular condition or diffuse "ring sarcoma." He said it is a rare disease; only about 100 cases are to be found in the literature up to 1930. In the opinion of some writers it starts in pigmented naevi known to have been present many years previously, while others consider it to have started in the stroma of the iris. Microscopically, they consist, almost without exception, of large spindle cells. No data are available as to metastases. Sarcoma of the iris is usually confused with iris cyst, congenital defect, or inflammatory process. The treatment advised is enucleation or an iridectomy if the neoplasm is small, well defined, and near the pupillary margin.

Choroideremia

Dr. J. Herbert Waite read a paper on this subject.

Experimental exophthalmos

Dr. Harry B. Friedgood from the Department of Physiology, Harvard Medical School, said that exophthalmos has been produced experimentally in mammals by four methods; namely, faradic stimulation of the cervical sympathetic chain or its superior ganglion (dog, cat, rabbit), phrenicosympathetic anastomosis (cat), daily injections of a chemically crude extract of the anterior hypophysis (guinea pig, dog), and daily injections of acetonitrile (rabbit). These mammals possess a system of orbital smooth musculature which, on contraction, is mechanically in a position to induce protrusion of the orbit. These muscles are known to be directly stimulated during the activity of the cervical sympathetics (first two methods), and are presumably involved (either directly or indirectly) in the production of exophthalmos by the third and fourth experimental procedures.

Exophthalmos and hyperthyroidism do not appear simultaneously after daily injections of an alkaline anterior hypophyseal extract. The exophthalmos usually does not become obvious until the height of the hyperthyroid state has been passed and the metabolic disturbance is subsiding (spontaneous remission); it is actually most marked when the basal metabolism has returned to a normal or subnormal level. Exophthalmos can also be induced in guinea pigs which have been completely thyroidectomized prior to injection with anterior hypophyseal extract. These experiments indicate that exophthalmos is not due to the hyperthyroidism. It is rather to be attributed to a substance in the extract which acts

without reference to a stimulating influence on the thyroid gland, and may actually be more prominent in the presence of a normal or subnormal basal metabolism.

The exophthalmos produced in rabbits by Marine, with injections of acetonitrile, is likewise independent of a hyperactive state within the thyroid gland. As a matter of fact, Marine has shown that it appears only in those animals which simultaneously develop hyperplastic parenchymal changes in the thyroid gland. He interprets these histological findings as evidence of functional exhaustion with hypofunction of the thyroid gland.

These experimental observations on the relation between the functional state of the thyroid gland and the occurrence of exophthalmos are of particular interest in view of the exophthalmos which is aggravated by or occurs for the first time after thyroidectomy for exophthalmic goiter. One must, however, make this comparison with utmost conservation because the anatomy of the orbit in man is said to be different from that of mamals in that the smooth musculature is generally vestigial in the former.

Trygve Gundersen,
Recorder.

WASHINGTON, D.C., OPHTHALMOLOGICAL SOCIETY

March 2, 1936

Dr. James N. Greear, Jr., president

Three cases of fracture of the skull with ophthalmological symptoms

Capt. Ross T. McIntyre, U.S.N., said that the first case was of a man who was struck in the head with an automobile crank August 7, 1935. There were a deep laceration of the scalp over the right frontal region, several abrasions and contused areas in the temporal region, and marked swelling of the eyelids; also escape of blood and of a sanguinous fluid from the nose and from the right external auditory canal. The left ear was normal. X-ray films of the skull demonstrated a simple fracture in the right parietal bone with an extension into the right wing of the sphenoid. Spinal puncture showed no increased intraspinal pressure. On September 11, 1935, further X-ray examination showed a slightly irregular fracture line in the right temporal bone with an ascending limb almost through to the axis of the body. There was a stellate line extending forward and downward through the middle fossa. The patient complained of headache and loss of vision in the right eye. There was a rupture of the tympanic membrane of the right ear and a decided decrease in hearing for high tones, which has remained. The left ear was normal in all respects. Visual fields for form and color in the right eye were concentrically contracted. The left fields were normal. The eyegrounds were normal. The visual defect has remained constant in the right eye, vision being 2/200 unimproved by correction. It would seem that the damage must have been anterior to the chiasm and at the location of the optic foramen.

The second case was of a man who was admitted to the hospital, unconscious, October 26, 1935, after an automobile accident. X-ray films showed a compound fracture of the right frontal bone into the right frontal sinus. The patient recovered from shock and progressed nicely until November 6th. He had complained of disturbance of vision in the right eye. The field of vision was concentrically contracted in the right eye and normal in the left. The fundi showed no pathology. On the 6th of November he showed signs of meningeal irritation and complained of marked loss of vision in the right eye. The pupil was markedly dilated but reacted to light and to accommodation. On November 11th he had severe headache and definite clinical signs of meningitis. Spinal puncture showed marked increase in pressure of the spinal fluid and smears and cultures were positive for pneumococcus. The patient died the following day. The cavernous sinus was infected and thrombosed 24 hours before his death. At autopsy the fracture was found to extend into the inner table, involving the optic fissure and injuring the optic nerve. There was a small hematoma lying on the nerve it-

self anterior to the chiasm. The fracture in this case was more severe but still a fair amount of vision remained in the injured eye.

The third case was of a man who fell into a coal pit, in August, 1935. Examination showed the patient to be suffering from shock and breathing with great difficulty. There was a three-inch laceration of the forehead extending over one-and-one-half inches above the left eye backward and temporally to the hair line. There was considerable swelling of the left eye and bleeding from the left side of the nose. The patient complained of loss of vision in the left eye. No intraocular pathology was found, only swelling of the soft tissues of the orbit and hemorrhage into the conjunctiva. The right eye was normal. X-ray films showed a fracture of the left wing of the sphenoid. There was no apparent displacement of the fragments. There were also a fracture of the 7th cervical vertebra and a fracture of the left clavicle. Visual fields were normal in the right eye, with complete loss of vision in the left. The iris was completely paralyzed. Ophthalmoscopic examination showed no evidence of any atrophy in the nerve head and no changes in the vessels of the retina. The damage here is similar to the previously reported case but there was complete loss of vision.

Discussion. Dr. James N. Greear said that he had had a similar case in a woman of 60 years who had fallen down stairs, fracturing her arm. Her attention was entirely taken up with the fractured arm and she had not noticed at the time the failure of vision in one eye. Six weeks after her injury she had only 20/200 in one eye with beginning atrophy and marked contraction of the visual field. An X-ray film of the skull showed no definite fracture line but there was some disturbance in the optic foramen. He believed that she did have a fracture through the optic canal. The accident happened six months ago and the vision is still 20/200.

Another case was that of a man who had only one eye and who ran into a tree. He was not rendered unconscious. Eighteen hours later he lost all central vision. There was a loss of the upper nasal field and four days later complete loss of the upper field, an altitudinous hemianopsia. There was papilledema of the lower margin of the disc. Two weeks later he had lost his peripheral field down to 20 degrees on the temporal side and about 5 degrees on the nasal. There were hemorrhages on the disc. His central vision is now normal, 20/15 but his field is tubular.

Retinoblastoma

Major Raymond O. Dart of the Army Medical Museum gave a brief review of the histology of retinoblastomas, their mode of extension, and the prognostic significance of extension outside the eyeball.

Uveitis with secondary glaucoma accompanying spontaneous absorption of the crystalline lens

Dr. Robert H. Courtney of Richmond reported five cases of acute uveitis with secondary glaucoma accompanying partial absorption of the crystalline lens in the fellow eye of patients who had previously had a successful cataract extraction from the first eye. In four of these cases the lens was extracted from the inflamed eye and this procedure was followed by very prompt subsidence of the uveitis. The fifth patient could not be operated upon because of extraneous circumstances and the eye was subsequently enucleated.

Ernest Sheppard,
Secretary.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

March 10, 1936

Dr. C. D. Blassingame, presiding

Malignant melanoma of choroid

Dr. R. O. Rychener reported a case of this condition in a man aged 33 years. Four years previously the vision in the left eye had begun to fail resulting in blindness for the past year. A week before his first examination the eye had become moderately injected and painful.

There was slight ciliary injection, a shallow anterior chamber, and newly formed vessels on the iris. Sheets of vitreous exudate and detachment of the retina below were noted. The eye transilluminated perfectly in all directions. Tension was 62 mm. Hg (Schiötz).

Enucleation a week later revealed the prescence of a malignant melanoma of the choroid which had extended through the sclera by way of the canal for one of the vortex veins. The tumor arose near the optic disc, was mushroom shaped, extending 5 mm. into the eye, rather heavily pigmented, and relatively vascular. Its position with reference to the optic nerve explained the negative result of transillumination.

Intraocular foreign body

Dr. R. O. Rychener reported a case of intraocular foreign body removed by the hand magnet. The patient, E. C. S., aged 37 years, had felt something hit the left eye while striking two hammers together nine days previously. There was a striate corneal opacity with ciliary injection, iritis, and hypopyon. X-ray films showed an intraocular foreign body which was localized 15 mm. behind the corneal center, but as the vitreous was entirely clear it was surmised that the localization was faulty. Application of the magnet disclosed the presence of a magnetic foreign body in the hypopyon. It was removed through a keratome incision below, without complication. A recheck of the localization figures disclosed an error, the localization really being 4 mm. behind the corneal center.

Plastic operation for deformity of outer canthus

Dr. Phil M. Lewis presented B. M., a colored woman, aged 21 years, on whom he had recently operated for a gross deformity of the outer canthus of the left eye. The patient had been in an automobile accident in November, 1934, and evidently the lacerations had been very poorly repaired. In December, 1934, a plastic operation had been performed in another city. A large thick graft was taken from the forehead just above and apparently partly including the left eyebrow. On coming to the Eye Clinic in December, 1935, she complained of hairs from the graft growing into the eye. She was also much dissatisfied with the appearance of the repaired area.

On January 10, 1936, the entire mass was excised. It was found to contain much sebaceous material and hair follicles similar to a dermoid. The conjunctival fistula was closed. The external canthal ligament was dissected out and anchored with a mattress suture to the periosteum of the orbit, high enough to correspond with that of the other side. By undermining the skin margins the wound was closed without much tension and a pressure bandage applied.

J. Wesley McKinney,
Secretary.

AMERICAN JOURNAL OF OPHTHALMOLOGY

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CONSECUTIVE EXTRACTION OF LENS AND CAPSULE

In spite of the steadily increasing popularity of intracapsular extraction, details of technique are freely debated. Some tumble the lens after seizing it near the lower pupillary margin; others grasp the capsule above. There is probably a good deal of difference as to the amount of counter pressure employed and the manner of its application. Different operators report varying percentages of cases in which intracapsular extraction is successfully accomplished.

Every well-reasoned and practicable suggestion or variation of technique is worthy of publication, and of trial in the hands of skillful operators who command abundance of material. Many new proposals will be discarded, ultimately perhaps even by their original proponents. Others may prove worthy of general adoption or may point the way to important changes varying from those at first put forward.

Three years ago (Bulletin et Mémoires de la Société Française d'Ophtalmologie, 1933, 46th year, page 254) Dejean, of Montpellier, France, modestly proposed a method in which he first opened the capsule and expelled the lens or its nucleus, and then removed the capsule separately as a later step of the same operation. He had ventured to apply the method to only five human subjects. The capsule was opened with a sharp hook instead of the usual cystotome; two oblique incisions being made with their base below and meeting at an angle above. After exposure of the lens, this capsular flap was seized with a forceps having "spatulated" blades. In four cases the procedure had proved practicable and relatively easy, but in the fifth case it had been impossible to seize the capsule.

Working without knowledge of Dejean's description, Horváth, of the Second Eye Clinic at Budapest, has undertaken a somewhat similar operation on

thirty eyes of twenty-six patients with gratifying results (Klinische Monatsblätter für Augenheilkunde, 1936, volume 96, page 746). His efforts are based on the desire to remove the lens with its capsule, and on the fact that by the present intracapsular methods combined removal cannot always be accomplished, sometimes because the zonular fibers are too strong, sometimes because the swollen lens does not permit the proper grasp on the capsule.

Experiments with pig eyes seemed to indicate that the capsule could be most successfully removed with forceps if it had been incised above, along the equator of the lens. Trial of this method in the human eye was delayed by the fact that the Budapest clinic was taking up the Knapp method of lens tumbling, by which it was hoped to obtain intracapsular extraction in one hundred percent of the cases. This hope was disappointed and it was found that there was an important number of cases in which intracapsular extraction was impossible.

Horváth describes as follows the technique of his consecutive removal of lens and capsule: An incision involving two fifths of the corneal limbus is sufficient. Complete or peripheral iridectomy is usually performed. With fine forceps the corneal flap is made to gape open, exposing the upper part of the lens. Near and almost parallel with the equator, an incision is made with a discission needle in the lens capsule, sufficiently large to allow the lens nucleus to pass without further rupture of the capsule. After expulsion of the lens, with irrigation if necessary for removal of fragments of lens substance, the corneal flap is again raised, and the open capsule forceps is introduced with one blade inside the capsule and the other in the anterior chamber. The corneal flap is released, and the capsule forceps is carried deeper toward the lower pupillary margin, and ultimately so far that the tips of the forceps blades lie behind the iris. The forceps being closed, traction is made upward, but of course without counterpressure on the eyeball. Withdrawal of the capsule is aided by pendulum movements in combination with the upward traction. Final withdrawal of the capsule without tearing is facilitated by grasping it also with the fine-tooth forceps which still remain in the left hand.

Like every technique of cataract extraction, this one is not without its possible complications. The forceps may not enter the capsule at the first attempt; in which case the attempt is to be repeated. The same advice is given in case the forceps slide off without tearing the capsule loose from the zonule. The capsule may tear before or after being separated from the zonule: in the former case the capsule is to be seized again, at another point; in the latter case it is better to extract the capsule by means of a blunt hook carried over its free lower margin. A small superior crescent of capsule may remain behind: this may easily be removed, but perhaps is just as well left in the eye. Lens fragments may remain in the anterior chamber but will usually be absorbed without difficulty. Very exceptionally, vitreous prolapse may arise from adhesion between capsule and vitreous.

Horváth recommends his operation particularly for those cases in which successful application of the intracapsular operation appears improbable. But he also commends its general use, since it does not make any greater demands on the operator than does the intracapsular operation. W. H. Crisp.

THE SCREEN PARALLAX FOR ORTHOPTIC TRAINING

The excellent account of the screen test, given by White in the August number (page 653), gives a clear explanation of its diagnostic value, as developed by the observations and suggestions of Duane. It is both an objective and a subjective test. The eye physician observes the movements of the eyes as they fixate or deviate, under alternate covering and exposure, while attention is fixed on a certain object. The patient, with the covering of first one eye and then the other, perceives an apparent movement of the object looked at; which makes necessary the movement of his eye to the new direction to fixate as directed. Both the

change of apparent position and the muscular action required to fix the eye in the new direction enter into the patient's consciousness. Such a recognition of true and false positions is a most important first step in orthoptic training.

For the older, intelligent patients, this is an exercise that the patient can easily practice for himself. If he is holding the screen in his own hand, and moving it from side to side, this furnishes an additional motor activity very directly connected with the parallax movement. If the patient is really eager to correct the position of his eyes, here is an exercise he can practice without the help of physician or technician, and be conscious of whatever improvement of coordination it brings. In some cases this resource will materially hasten improvement; and the variety of resources will delay the patient's loss of interest and faith in the orthoptic regime. Such exercises require intelligent supervision, and the assistance of technical skill. But they add to the interest of the patient and enlist an exercise of his will power. When the patient describes his, or her, experiences with the exercises, it will sometimes furnish a hint for needed suggestions from the physician. Both may learn from such a comparison of experiences of the obstacles and best means of overcoming them in the early steps of fusion training.

Edward Jackson.

THE TEACHERS' SECTION OF THE ACADEMY

The problem of graduate training of physicians has been under consideration for many years but as yet no entirely satisfactory system has been evolved. Until recently, and perhaps even now, the majority of ophthalmologists have acquired their education in the specialty by acting as assistants in private offices. The absolute need for at least a year of hospital experience to round out the largely didactic teaching in the medical schools has been so well recognized that for many years practically all medical students have sought hospital appointments. After this service the young man has entered an office as assistant. Trusting thus largely to one or two men for instruction, the results have depended almost entirely on the individual with whom the association was made and on the character of his practice.

The ophthalmological assistant learned practical refraction primarily. No instruction in optics except such as was obtained by collateral reading, clarified the reasonableness of the method employed and few men are capable of understanding a treatise on optics unless it is interpreted for them. This the busy practitioner rarely had time to do even if he had the requisite knowledge; which is quite doubtful, since his training had usually been as sketchy as his assistant's. The student also observed and studied the run of pathologic conditions which enter an office. He had a very limited surgical training. In surgery there is considerable individual variation but usually very little variety in the material and surgical methods of any one man.

These apprenticeships extended from two to three years, during which time the assistant presumably improved his knowledge by the study of books. The chief criticism of this method is that it lacked system and direction. Without instruction and guidance, the interesting subjects are studied whereas the uninteresting and difficult are neglected. From this training, therefore, the assistant was apt to emerge with a poorly balanced education. This fact was so well recognized in many offices that it was routine for the young man after three years as assistant to go to Vienna or other European medical center for an additional year or two of study.

Another method for graduate training that evolved early but could take care of only a few of the applicants was internship in a specialty hospital. In general, this offered good educational opportunities. Its chief lack has been similar to that of office training; namely, directed systematic instruction.

About five years ago members of the Academy who had been studying the

problem for many years thought that something constructive might be accomplished by forming a Teachers' Section. This was accordingly done, and a great deal of time and energy spent by some two dozen men in collecting material and reviewing the subject. This was an essential foundation on which to build. Meetings have been devoted to the presentation of these data to the membership and to pertinent talks. Many excellent suggestions have been made but little action has been taken.

Certain points stand out clearly, of which perhaps the most important is the lack of teachers and facilities for giving adequate postgraduate instruction. There is and always will be difference of opinion as to proportioning the training between the didactic and the practical, but it is possible to outline a satisfactory course. However, to be able to offer this to the large number of men seeking it is now impossible.

There are vastly too many features vital to this subject to justify opening a discussion of details, but suggestions regarding methods for furthering consideration of the problem are appropriate.

It is time now for the formulation of some concrete program in graduate instruction. It can be the basic structure only but should be planned to permit of expansion. This can be done only by a representative group of ophthalmologists and otolaryngologists. Probably the make-up of this committee should be similar to that of the American Board of Ophthalmology. It should be relatively small for reasons of efficiency and expedition. The existing Boards might serve very well but it is a serious question if the same men should be asked to assume this great burden in addition to that which they now carry in their work as examiners.

This graduate problem is exceedingly difficult and its solution will require many years of hard work. Much discussion and fact finding still remain to be done. The Teachers' Section has been excellent but inadequate. Perhaps a hundred and fifty members were in attendance at the dinner this year. An hour or more was occupied by guest speakers who discussed the broader phases of the subject very interestingly and in a manner similar to that of other speakers in previous years. Then the prepared ideas of half a dozen members were given. Obviously these had been carefully thought out and all deserved long and deliberate discussion with a view to classification, correlation, and the establishment of concrete suggestions. Unfortunately, after the reading of the last of these the hour was late and no discussion at all was possible. The members must have felt a bit thwarted and gone away thinking that this method of considering the problem was rather futile. To have carried the discussion to a conclusion from the point reached by the speakers was obviously not to be considered for it would have required at least a week of daily sessions to have evaluated the diversity of ideas presented.

It is for these reasons that a small representative committee to formulate a plan and present it for consideration by the various national bodies of ophthalmology and otolaryngology is suggested. It would seem best that this should not be the present Boards of Ophthalmology and of Otolaryngology, primarily because the consideration of this problem should be the sole function of this body, otherwise one activity is apt to suffer at the expense of the other, and as already mentioned it is too much to ask of a man that he should contribute as much time as this double duty would require. The board might well, however, be made up of delegates elected from such organizations as are represented on the present Boards of Ophthalmology and of Otolaryngology.

Lawrence T. Post.

BOOK NOTICES

Detachment of the retina and its treatment. By F. Terrien, Prosper Veil, and M.-A. Dollfus. 163 pages, with 45 illustrations in the text and 4 plates in colors. Stiff paper covers.

Masson et Cie, Publishers for the Académie de Médecine, Paris, 1936. Price 40 francs.

The authors hesitate to add to the existing literature on the subject, especially Gonin's magnificent volume. But they feel that personal experiences at the eye clinic of the Hôtel-Dieu and in their daily practice in the past five years may throw light on the subject. They regret the hesitation which leads many colleagues to limit themselves still to subconjunctival injections with loss of valuable time. They have tried all the techniques put forward.

The color plates present interesting examples of different types of retinal tear. Chapter one is devoted to a clinical study of retinal detachment, with a brief discussion of premonitory symptoms and modes of onset, and a detailed discussion of the forms of detachment, especially in relation to type of tear, age of detachment, presence of exudate, condition of the vitreous, and etiology. Of the authors' first 150 detachments, 92 had V-shaped tears with flap. Multiplicity of tears in the same eye was found more frequently with perforations than with flap tears.

Although in case of a visible tear it is desirable to intervene surgically as early as possible, it is advisable to attempt preliminary reapplication of the retina by having the patient completely immobilized for forty-eight hours, wearing stenopeic spectacles. If the detachment is above, the patient's head should be lower than his feet, without pillow. After the forty-eight-hour interval, localization should be carefully undertaken in the dark room.

A large amount of space is naturally devoted to appraisal of the different surgical techniques and their selection for different types of case. Obliterating thermopuncture is reserved for small single tears, well localized, easily accessible, and situated in relatively healthy tissue. Diathermy is used for the small round and frequently multiple tears found in degenerated retinas; and also for very extensive tears, large or multiple, in which a double diathermic barrage, either superficial or perforating, is employed. For macular tears diathermy applied to the macular region has not given the results obtained by Lindner with suprachoroidal injection of caustic potash.

A brief final chapter is devoted to the medicolegal aspects of retinal detachment.

W. H. Crisp.

Polychromatic plates for color-sense examination. By Dr. E. B. Rabkin, Director of the Ukrainian Prof. Hirshman Memorial Central Ophthalmic Institute. 40 pages to which are added 20 color plates. Cloth bound. Published by State Medical Publishing Board, Kief and Kharkof, U.S.S.R., 1936. Price 30 rubles.

The twenty diagnostic plates contained in this volume were designed by the author. In general, they are along the lines of the Ishihara plates for testing color vision. But the designs for recognition by the patient consist of numbers and geometric forms (circle, triangle, square). The plates are so planned that it is possible to differentiate between the principal forms of defect (protanopia, deuteranopia, protanomaly, and deuteranomaly). Certain numbers or geometric forms are obvious to the normal eye, whereas the person with defective color vision sees other numbers or forms.

The experimental basis of these plates and their clinical application were worked out in the experimental ophthalmic clinic of the Institute of Experimental Medicine and in the Hirshman Memorial Central Ophthalmic Institute.

The volume is suitable for use in English-speaking countries or in Russia, since the preface and the careful explanation of the principles and application of the tests are printed in both languages.

Dr. Rabkin, who is well known to many American colleagues since his visits to the United States, is to be congratulated on the effectiveness of design of these plates, the printing of which has been most efficiently exe-

cuted by the Ukrainian Medical Publishing Board and the Kharkof Polygraphic Institute. W. H. Crisp.

CORRESPONDENCE

Quackery in ophthalmology

August 14, 1936

Editor,
American Journal of Ophthalmology:

Dr. Crisp's editorial in the August, 1936 issue of your Journal touches on a very important subject of quackery in ophthalmology. The editorial does not give an answer to the question why the quacks are successful in fooling the people. It is not enough to say that the people in general are credulous and respond easily to promises that cannot be fulfilled and that are given for pecuniary reasons. Many patients are convinced that the quacks have been their benefactors, that through exercises they have learned to dispense with glasses which have been worn for years. There must be a serious reason for the spread of quackery and for the belief of some patients that exercises may make superfluous the wearing of glasses.

I have already written in my letter on "Refraction in Europe and America" published in the April, 1936 issue of your Journal that thousands of people in America are wearing glasses unnecessarily. This is caused by standardization, lack of individual approach, and overestimation of trifles which have little practical value. Particularly is it true in regard to the large number of optometrists who test refraction and often call themselves "eyesight specialists." In cases of hyperopia, slight myopia, and slight astigmatism *many* can get along pretty well without glasses.

If a patient who has unnecessarily worn glasses for years comes to a quack, he pays for the exercises and soon parts with the glasses. It does not occur to the patient that he never needed glasses or that he could get along without them. He knows that he was advised by "specialists" to wear them constantly. He tells his friends to go to the quack to learn how to dispense with glasses. The fame of the quacks spreads, and people flock to their offices expecting a marvelous cure. Here lies the foundation of the quack's success.

If prescription of glasses were the privilege of the physician only, and if instead of standardization, discrimination were accepted, the quack would be unable to fool the people, the patient would not believe in quackery, and prescription of glasses would be based on a sound foundation.

(Signed) O. R. Lourie.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, history
19. Anatomy, embryology, and comparative ophthalmology

1

GENERAL METHODS OF DIAGNOSIS

Bichelonne, Favory, and Bégué. **The use of selective yellow light in ophthalmology.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 3-7.

The use of cadmium sulphide glass which transmits the red, yellow, and green rays of the spectrum has been of value in automobile headlights. It reduces glare and retinal fatigue, and increases visibility in fog. The authors determined that visual acuity and ease of reading were increased with use of this light. Ophthalmoscopy was facilitated because of absence of glare and reduced tendency for the pupil to contract. P. J. Leinfelder.

Caramazza, Filippo. **Results of biologic test, by Ninni's method, of aqueous or vitreous taken from rabbit eyes which had been inoculated with emulsion of tuberculous processes from human tubercle bacilli.** Boll. d'Ocul., 1936, v. 15, April, pp. 417-430.

This biologic test of rabbit eyes inoculated with emulsion of tuberculous peritracheal gland of the guinea pig, infected with human tubercle bacilli, was negative if done between inoculation and the beginning of the tuberculous process in the eye, whereas it was positive if done when the tuberculous eye lesion was well developed. M. Lombardo.

Castroviejo, Ramon. **An illuminating device to be used as an attachment to the binocular corneal microscope for gonioscopy and goniophotography,** Amer. Jour. Ophth., 1936, v. 19, Sept., pp. 786-789.

Horner, W. D. **A special clamp for holding lid sutures in cataract operations.** Trans. Pacific Coast Oto-Ophth. Soc., 1935, 23rd annual meeting, pp. 149-151. (See Amer. Jour. Ophth., 1935, v. 18, Oct., p. 957.)

Litinskii, G. A. **Stereomyograph and apparatus for determination of depth perception and muscle balance.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 6, p. 804.

A detailed description of this apparatus, which permits study of depth perception, muscle balance, accommodation, convergence, visual acuity for near, size of pupils under standard illumination, interpupillary distance, and range of ocular movements. (Illustrations.) Ray K. Daily.

Pergola, A. **Ocular changes in mechanical asphyxia (experimental studies).** Lettura Oft., 1936, v. 13, March, p. 83.

Pathological changes in the ocular tissues of animals killed by hanging, and by strangling with hand and with cord, were studied and are reported as a contribution to legal medicine. In all three types pronounced stasis and vasodilatation were found in the uveal tract except the iris; more marked in those dead from strangling and by hanging. Bloody extravasations into the choroid were present in those hanged and those strangled with the hand.

In the strangled animals particular mention was made of the formation of vacuoles in the peripheral strata of the lens. In all three types the optic nerve showed edema especially in the interfascicular tissues of the retrobulbar portion. Nothing of note was observed in the retina.

The author considers these constant and characteristic findings pathognomonic and presents them as auxiliary symptoms which when added to other data permit a differential diagnosis as to these various types of death.

F. M. Crage.

Schoenberg, Mark J. **A new model of an enophthalmometer and exophthalmometer.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 399-401.

The author presents a model which overcomes some of the disadvantages of the Hertel instrument. The head is immobilized with chin rest and head rest and by means of a visor device the determination of the line tangential with the corneal apex is easily made. This method insures more accurate measurements of small degrees of exophthalmos and enophthalmos.

C. Allen Dickey.

Schupfer, Francesco. **Perdrau-Ghigi's method modified by Scapaticci for reticular connective tissue.** Boll. d'Ocul., 1936, v. 15, May, pp. 598-601.

A description is given of this method of silver impregnation. Its advantages are the easy technique and almost constantly good results. (Bibliography, 3 figures.) M. Lombardo.

Shapira, T. M., and Crage, F. M. **Pupillary variability in 108 syphilitic patients.** Amer. Jour. Ophth., 1936, v. 19, Oct., pp. 891-893.

Srinivasan, E. C. **A few slitlamp observations.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 214-217.

The findings deal with some common affections, including superficial punctate keratitis and iritis, with differentiation from spring catarrh and leprosy. After noting the frequency of lenticular opacities in young myopes, the author suggests this as the original cause of progressive myopia through change of lens index of refraction affecting the accommodation.

Lawrence G. Dunlap.

Walker, J. P. S. **A portable scotometer.** Brit. Jour. Ophth., 1936, v. 20, Aug., pp. 466-467.

The portable projection scotometer devised by the author folds into a case, and is useful in homes as well as for office practice. Bulbs and battery of the ordinary pocket size are satisfactory for use. The advantage of the projection scotometer is that the patient's attention is not diverted by the operator's hand or by the mechanism, as the instrument is behind the patient. (1 Illustration.) D. F. Harbridge.

Wilenkin, M. **A diaphragm for the electric ophthalmoscope of Dr. H. Wolff.** Klin. M. f. Augenh., 1936, v. 96, June, p. 820.

To reduce the large field of illumination, which makes examination of the macula through small pupils difficult or impossible, the author recommends a diaphragm over the condenser.

C. Zimmerman.

2

THERAPEUTICS AND OPERATIONS

Burky, E. L. **Studies on the action of staphylococcus toxin and antitoxin**

with special reference to ophthalmology. Amer. Jour. Ophth., 1936, v. 19, Oct., pp. 841-851.

Fiore, Tito. **Action of optochin, fluorescein, and optochin fluoresceinate on the metabolism of the pneumococcus.** Boll. d'Ocul., 1936, v. 15, June, pp. 607-611.

The writer gives in a tabulated form the results of his experiments in regard to the use of oxygen and the production of the hydrogen peroxide on the part of pneumococci either alone or in the presence of optochin, fluorescein, or fluoresceinate of optochin. He comes to the conclusion that optochin is a strong inhibitor of aërobic oxidations produced by the germs. Fluorescein in the dark helps oxidation of the bacterium and in the light stops it. The author discusses the therapeutic activity of optochin and its action on deidrogenetic enzymes of the pneumococcus. (Bibliography.) M. Lombardo.

Guha, G. S. **The role of vitamins in ocular affections.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 82-85.

The author used vitamin A with fine results in such eye disorders as low myopia, asthenopia, mild ptosis, and transient mild episcleritis.

Lawrence G. Dunlap.

Hanumantha Rao, M. V. **Modern methods of general anesthesia in ophthalmic practice.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 238-242.

Evipal (sodium evipan), when intravenous injections can be made, is most satisfactory, especially when a retrobulbar injection is used as adjuvant in painful operations such as iridectomy for secondary glaucoma. One patient sneezed for nearly an hour after the anesthetic was injected, and no operation could be done. Another sobbed for a half hour, another yawned fifteen minutes, while still another vomited once; but 22 other cases were satisfactory. A six-year-old child vomited twenty times in twenty-four hours after removal of a membranous cataract through a keratome incision under chloroform anesthesia. A small iris prolapse was replaced under avertin anesthesia. Avertin is recommended for operations in highly excitable children, especially those of one to six years.

Lawrence G. Dunlap.

Hesky, Mario. **Hemostatic clamp for canthotomy.** Boll. d'Ocul., 1936, v. 15, June, pp. 679-682.

The author describes and illustrates a clamp by which a bloodless field is obtained in canthotomy. The advantages are ease of application after the incision at the canthus, controllable pressure on the cut structures, and absence of incumbrance in the operative field. (3 figures.) M. Lombardo.

Hill, E., and Courtney, R. H. **A critical summary of surgical experiences in 1934.** Amer. Jour. Ophth., 1936, v. 19, Sept., pp. 773-779.

Merkulov, I. I. **The action of X rays and radium on the eye.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 6, p. 836.

A review of the literature and a report of the effect of radium and X rays on fifteen eyes irradiated because of intraorbital tumors. One of the orbits treated by X rays was finally exenterated and microscopic sections of the eyeball demonstrated the pathologic changes caused by an overdose of X rays. In one case treated with radium there was late development of cataract and in two keratq-iritis. A normal eye tolerates one hundred percent of the erythema dose; but an inflamed eye is more sensitive and the dosage should be reduced by 15 or 20 percent. Repeated doses may be as large provided there is a two or three months interval between irradiations. Excessive and too frequent doses of X rays and radium produce kerato-conjunctivitis, iridocyclitis, cataract, and telangiectasis of the conjunctival and scleral vessels. A safe radium dose is two hundred milligram hours. For most diseases the therapeutic doses of X rays and radium are far below the erythema dose and are therefore absolutely harmless.

Ray K. Daily.

Nastri, F. **Effects on the eye of local application of extracts of the posterior lobe of the hypophysis.** Boll. d'Ocul., 1936, v. 15, June, pp. 612-626.

Posterior-lobe extract has a hemostatic and mydriatic action and lowers intraocular pressure. In combination with a solution of novocaine it increases anesthetic power and mydriatic action. (Bibliography.)

M. Lombardo.

Refatullah, M. **The role of anesthesia in ophthalmology.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 226-237.

The author discusses the local anesthetics used in the Eye Infirmary, Medical College Hospitals, Calcutta. Pantocain, preferred for tonometry and removal of foreign bodies causes too much hemorrhage for conjunctival or bulbar surgery. O'Brien's akinesia by blocking over the condyle of the lower jaw is highly praised. General anesthetics used are chloroform, ether, and "ACE." Evipal (sodium evipan) has been used in one hundred operations, including paracentesis, enucleation, evisceration, cataract, trephine, iridectomy with acute secondary glaucoma, exenteration of orbital growth, and squint, with no untoward results. The only contraindications to its use are liver disease and low blood pressure.

Lawrence G. Dunlap.

Sen, K. **Asepsis of the conjunctival sac in intraocular operations.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 223-225.

The author continues a report previously published (see Amer. Jour. Ophth., 1935, v. 18, p. 977). Of four eyes lost by panophthalmitis, three were due to B. pyocyaneus infection and one to staphylococcus aureus. One pyocyaneus infection was traced to the patient's ear and the other two to septic surgical cases near by. The aureus infection was traced to the other conjunctival sac of the patient. Even a conjunctival sac from which an eye had been removed was a source of infection to the fellow eye until the socket was filled with ointment and securely bandaged. Now, irrespective of the eye to be operated upon, both eyes are treated in the usual way. The operation is not postponed when a growth of staphylococcus is found.

Lawrence G. Dunlap.

3

PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Adler, F. H., and Meyer, G. P. **The mechanism of the fovea.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 266-280.

By an ingenious series of experiments in which the effects of various factors have been independently analyzed, the authors find the "physiologic fovea" to be approximately 0.25 mm. in diameter. Within this area the sensitivity is the same and the acuity depends upon length of exposure. The limits of acuity are not determined by size of individual receptors, and low thresholds can best be explained on the basis of summation.

David O. Harrington.

Bogoslovskii, A. I. **Conditioned reflex changes in fusion frequency of central and peripheral vision.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 6, p. 795.

The criteria were lowered fusion frequency for peripheral vision and increased fusion frequency for central vision under the influence of sound. After a series of tests with sound which was always introduced at the same period of dark adaptation, similar results were obtained in tests at the same period of dark adaptation without the introduction of sound. The reflex thus conditioned by time lasted several days and wore off spontaneously. Since the cerebral cortex takes part in conditioned reflexes this field offers an opportunity for the study of the cerebral component in sensory activities. The experiments also point to the possibility of raising the visual activity under definite conditions. Ray K. Daily.

Brandenburg, K. C. **Aniseikonia.** California and Western Med., 1935, v. 43, Sept., p. 188.

Brandenburg cites a typical case in which merely an exact refraction and glasses will not relieve all symptoms of strain and headache. He states that retinal images of an object are very frequently of different size and shape in both eyes and this must be taken into account and corrected.

Theodore M. Shapira.

Dowling, H. **An analysis of visual findings in subnormal individuals.** Jour. Michigan State Med. Soc., 1936, v. 35, March, p. 164.

The five tables presented show that visual findings in subnormals run closely parallel to those of normals.

Theodore M. Shapira.

Gellhorn, E. **The effect of O_2 lack, variations in the CO_2 constant of the inspired air, and hyperpnea on visual intensity discrimination.** Amer. Jour. Physiology, 1936, v. 115, May, p. 679.

Gellhorn states that O_2 lack, six per cent-CO_2-air mixtures, and hyperpnea produce a reversible decrease in visual intensity discrimination. Magnitude of change and duration of recovery depend on degree of O_2 lack. Excitability of auditory and visual apparatuses are influenced in a similar manner by hyperpnea, O_2 lack, and CO_2 excess.

Theodore M. Shapira.

Krauss, Stephen. **On some optical phenomena observed in light adaptation and related to the Purkinje phenomenon.** Folia Ophth. Orientalia, 1936, v. 2, April, p. 136.

The author describes the episcotister, a black rotating disc with a variable sector through which a shadow is thrown on the colors lying behind. When red and blue of exactly the same brightness are viewed through the episcotister, blue appears brighter than red. From this one may conclude that the Purkinje phenomenon is not dependent upon dark adaptation alone, but rather upon changes in the intervening optical medium, since it appears when an artificial veil is placed in front of the colors by the episcotister.

R. Grunfeld.

Kravkov, C. B. **The effect of auditory stimulation on light and color sensitivity.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 6, p. 787.

The thresholds of light and color perception were charted during forty minutes of dark adaptation, and then the auditory apparatus was stimulated for ten minutes by a sound from a generator; the thresholds of light and color perception were tested three times during the ten minutes. The resulting curves show that auditory stimuli diminish the light sensitivity of the eye. Sensitivity for color is increased for short waves and lowered for long waves. The maximum increase is in the region of 520-530 millimicra, and the maximum decrease in the region of 580-600 millimicra. It appears that sound stimulates perception for green and blue, and lowers perception for red. These findings call for revaluation of the visibility of red signals, under the influence of sound. Ray K. Daily.

Lo Cascio, G., and Friedmann, G. **The action of light on the amino-acid content of the retina.** Ann. di Ottal., 1936, v. 64, May, 289.

The author studied the amino-acid content of the retina under conditions of illumination and darkness and reached the conclusion that after the eye of the animal had been exposed to intense light for a period of several hours there was a smaller amount of amino acid in the retina than found in animals kept in darkness. The diminution is probably due to the well known phenomenon of photolysis of the amino acid. (Bibliography.) Park Lewis.

Podestà, H. **Contribution to the question of delimiting congenital disturbances of color sense, especially total color blindness.** Klin. M. f. Augenh., 1936, v. 96, June, p. 786.

Podestà suggests distinguishing simple, uncomplicated, or true total color blindness from total color blindness accompanied by poor vision, photophobia, and nystagmus, with simple regressive heredity, more regular distribution between the sexes, and frequent blood re-

lationship. The latter may rest upon pathological changes in the visual tract. For discrimination a greater consideration of the different hereditary types of both forms seems most important. The heredity common to both forms suggests the question whether eugenic measures should be adopted to prevent hereditary transmission of total color blindness. C. Zimmermann.

Rodriguez, B., and Raffo, L. A. **Bilateral ophthalmoplegia (paralysis of third pair) consecutive to lethargic encephalitis.** Rev. de Ophth. de São Paulo, 1936, v. 4, May, pp. 420-434.

A man of 19 years who a year and a half ago had a severe lethargic encephalitis has shown persistent paralyses involving all the muscles innervated by the motor oculi (bilateral external and internal ophthalmoplegia). The general subject of paralysis of the motor oculi is discussed at considerable length, and an extensive bibliography is added.
W. H. Crisp.

Vito, Pietro. **The properties of the curves showing the behavior of visual acuity along the principal meridians of the retina.** Ann. di Ottal., 1936, v. 64, May, p. 341.

The author has studied the retinal curves corresponding to the visual acuity in the principal meridians of the eye. While the equations cannot be determined exactly the approximations are sufficient to warrant the conclusion that the visual-acuity curve of each half of the horizon meridian takes a parabolic form while each half of the vertical curve is more nearly hyperbolic. (Bibliography.) Park Lewis.

Williamson-Noble, F. A. **A modification of bifocals.** Brit. Jour. Ophth., 1936, v. 20, Aug., pp. 464-465.

Wearers of bifocals complain frequently of difficulty in stepping down from curbs and so on. In the lens here described, the distance and reading centers coincide, eliminating the seeming movement of an object when the wearer looks down. (2 illustrations.)
D. F. Harbridge.

4

OCULAR MOVEMENTS

Agnello, Francesco. **A case of congenital bilateral paralysis of the abducens.** Riv. Oto-Neuro-Oft., 1936, v. 13, Jan.-Feb., pp. 53-65.

A woman of 64 years, a congenital luetic, with high myopia but 9/10 vision upon correction, showed normal primary position, normal convergence, and normal elevation and depression, but on looking right the right eye and on looking left the left eye stopped at the median line, whereas each eye had normal adduction. No diplopia was demonstrable. The writer considers the defect of nuclear origin, perhaps due to luetic destruction of the sixth nuclei in fetal life. (Bibliography, 3 figures.)
M. Lombardo.

Alabaster, E. B. **Remarks on the physiology of convergent concomitant strabismus.** Trans. Ophth. Soc. United Kingdom, 1935, v. 55, p. 321.

The author had always been impressed by the association of concomitant squint with an unstable nervous system. Binocular field examinations were made in normal cases and in muscle paralyses and concomitant squints. In the normals there was fusion of colors in all parts of the fields, the unpaired portion of the field perceiving color of the respective side. In paralytic cases with diplopia an ever-changing patchwork was formed by the two colors, while in concomitants one color only was seen in the central portion, that being the color received by the fixing eye.

The author concludes that it is extremely unlikely that a false macula will develop in the portion of the eye that is not being used but that in concomitant cases projection is accurate in the portion of the squinting eye which is being used. Beulah Cushman.

Balduzzi, Ottorino. **The opticokinetic nystagmus in mesencephalic lesions.** Riv. Oto-Neuro-Oft., 1936, v. 13, March-April, pp. 165-179.

A woman of 21 years, another of 32, and a girl of 13 were affected respec-

tively with pontine-peduncular glioblastoma, meningioma of the pons, and right temporo-mesencephalic cystic glioma. Ocular symptoms included nystagmiform movements in the extreme lateral rotation. The corresponding general and focal nervous symptoms showed disappearance of normal optico-kinetic nystagmus. Absence of optic nystagmus is an early symptom of conjugate oculomotor changes and an important part of the mesencephalic syndrome, especially in cases in which signs of oculogyral function are still present. Bibliography, 3 figures.)

M. Lombardo.

Clark, C. P. **Paralysis of divergence of functional origin.** Amer. Jour. Ophth., 1936, v. 19, Sept., pp. 789-791.

Mowrer, O., Ruch, T., and Miller, N. **The corneo-retinal potential difference as the basis of the galvanometric method of recording eye movements.** Amer. Jour. Physiology, 1936, v. 114, Jan., p. 423.

Seeking to confirm the experiments of Meyers and Jacobson, the authors conclude that (1) the observed polarity of the galvanometric effects associated with eye movements fulfills the expectations arising from the corneo-retinal potential difference hypothesis and not those arising from the action-current hypothesis; (2) passive movements of the eyes produce galvanometric deflections strictly comparable in magnitude and polarity to those produced by active voluntary eye movements; (3) movements of the eyes are accompanied by virtually no galvanometric effects after the retina is destroyed by chemical means; (4) the existence of the corneo-retinal potential difference has been directly demonstrated by earlier investigators.

Theodore M. Shapira.

O'Connor, R. P. **Surgical correction of pure convergence insufficiency.** Trans. Pacific Coast Oto-Ophth. Soc., 1935, 23rd annual meeting, p. 50. (See Amer. Jour. Ophth., 1936, v. 19, April, p. 354.)

Ohm, J. **A peculiar optokinetic reaction in a case of hole in the macula.** Zeit. f. Augenh., 1936, v. 89, Aug., p. 327.

On some nystagmograms taken in the hope of determining objectively the visual loss in a suspected malingerer, Ohm noted a difference in amplitude and energy of optokinetic nystagmoid oscillations which depended on which eye was stimulated and the direction of revolution of the striped drum. Explanation was found in the fact that a slight congenital nystagmus which had been missed on first examination summated with the optokinetic nystagmus and produced neutralization in one direction and doubling in the other. Incidentally, it was found that a small macular hole did not decrease optokinetic nystagmus.

F. Herbert Haessler.

Verhoeff, F. H. **A kinetic test for stereoscopic vision.** Trans. Amer. Ophth. Soc., 1935, v. 33, p. 127. (See Amer. Jour. Ophth., 1936, v. 19, Oct., p. 914.)

Zachariah, G. **A case of ophthalmic migraine involving the sixth nerve.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 211-213.

This is a case report of a left external rectus paralysis, following a head cold and sore throat of the previous week. The diplopia lasted six days and disappeared under treatment with potassium iodide and sodium salicylate. Headache and pain were the only migrainous symptoms.

Lawrence G. Dunlap.

5

CONJUNCTIVA

Anastasi, Giovanni. **Lymphoma of the conjunctiva.** Ann. di Ottal., 1936, v. 64, May, p. 310.

The author reviews recorded cases. He adds a study of three cases which came under his own observation. His conclusions are that conjunctival lymphoma is a definite entity both clinically and histologically, that it is a benign tumor, that it cannot always be differentiated clinically from other con-

junctival neoplasias but that the histologic picture is invariable. The treatment is surgical when the new growth is situated at the plica semilunaris, but elsewhere roentgen therapy is effective. (3 plates, bibliography.) Park Lewis.

Apetz, W. **Argidal in ophthalmology.** Klin. M. f. Augenh., 1936, v. 97, July, p. 73.

Argidal is a five-percent solution of acetyl salicylate of hexamethylintetramin silver (0.2-percent silver). For a year Apetz used it in 1.5-percent solutions for conjunctival and lacrimal inflammations, with good results. It is less painful than nitrate of silver. In diplobacillary conjunctivitis zinc solutions were better. C. Zimmermann.

Ascher, K. W. **Massage in the treatment of trachoma.** Zeit. f. Augenh., 1936, v. 89, Aug., p. 336.

Because the glass rods used in massage of the conjunctiva of trachoma occasionally break, Ascher procured a silver rod 8 cm. long with a 9 mm. highly polished sphere at one end and a slightly rough one at the other. The rough end is used for rather granular conjunctiva. The author tentatively ascribes the satisfactory results of treatment to specific oligodynamic action of the metal. He suggests trying other metals, for example copper and gold. F. Herbert Haessler.

Banerji, N. C. **Spring catarrh in Bengal.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 100-105.

Spring catarrh is very common in Bengal, occurring at any time of year. The author states that 51 percent of the patients are less than 15 years and only 4 percent over 25 years of age; that 80 percent are males; and that 72 percent are of the palpebral type, 12 percent bulbar, and 16 percent mixed. He mentions doubtful results following surgical treatment, autohemotherapy, splenic extract, arsenic calcium, ultraviolet rays, lactic acid, or chaulmoogra oil. Beside astringents, Crookes lenses, and general tonic measures, radium is often effective.

Lawrence G. Dunlap.

Desai, H. M. **Notes on subconjunctival injection of guaiacol cacodylate in phlyctenular keratoconjunctivitis.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 132-133.

Where phlyctenular disease of the conjunctiva and cornea does not respond to ordinary methods of treatment, including tuberculin, the author has treated several thousand cases in the past eighteen years in patients with a scrofulous diathesis by cocainizing the eye and injecting five to ten minims of two percent aqueous solution of guaiacol cacodylate subconjunctivally as near the phlycten as possible. After-pain is slight, lasting one-half to two hours, and marked relief of symptoms occurs in 24 hours. The injection must not be repeated earlier than the fourth day. Cases of moderate severity require about two injections, while severe cases may require five or six injections.

Lawrence G. Dunlap.

Duraiswami, T. S. **A case of conjunctival inflammation—diphtheric?** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 110-114.

A 28-year-old psychoneurotic single female was finally thought guilty of placing foreign bodies in her left upper fornix. Lawrence G. Dunlap.

Frogé, P., and Chiniara, J. **Consideration on edema of the ocular limbus due to sunlight.** Folia Ophth. Orientalia, 1936, v. 2, April, p. 131.

Vernal catarrh appears in three forms of intensities: (1) strong vascularization at the limbus in the interpalpebral area; (2) an edematous pad impinging on the limbus; (3) greyish infiltration of the limbus with vascularization and white dots. Clinical observation and animal experimentation lead the authors to hold the action of sunlight on a specially sensitive organ to be the main etiologic factor, but they are unable to indicate the mechanism involved or to establish the part played by porphyrin in these photosensitive persons. R. Grunfeld.

Frogé, P., and Poursines, Y. **Contribution to examination of the trachoma-**

tous palpebral conjunctiva with the corneal microscope. Folio Ophth. Orientalia, 1935, v. 2, Nov., p. 43.

This report is preliminary to a more comprehensive study in which the authors attempt to correlate the slitlamp findings on the conjunctiva with the clinical appearances of trachoma in regard to the second and third stages of MacCallan. R. Grunfeld.

Gifford, S. R., and Lazar, N. K. **Inclusion bodies in ophthalmia neonatorum.** Further note. Trans. Amer. Ophth. Soc., 1935, v. 33, p. 382. (See Amer. Jour. Ophth., 1936, v. 19, Jan., p. 61.)

Kattan, M. A. El. **Leishmaniasis of the eyelids and conjunctiva in Egypt.** Bull. Ophth. Soc. Egypt, 1935, v. 28, p. 12. (See Section 14, Eyelids and lacrimal apparatus.)

Narayanaswami Pillai, V. **Tuberculous ulceration of the conjunctiva.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 106-109.

A case of lupoid keratoconjunctivitis of several years duration in a Hindu male aged twenty years was treated with iodoform locally, cod liver oil, good diet, tubercle bacillary emulsion. Healing resulted in four months. Only five cases of tuberculosis of the conjunctiva have been seen in fifteen years among a quarter of a million new patients. Lawrence G. Dunlap.

Onisi, Yosiharu. **On Prowazek bodies in laboratory sections; with observations on geographic statistics as to the occurrence of Prowazek bodies.** Klin. M. f. Augenh., 1936, v. 96, June, p. 797.

For five years Onisi carefully examined smears and sections from 1,448 cases of trachoma in Northern Japan. He found Prowazek's bodies 54 times (63.73 percent). This percentage is lower than in other parts of Japan. The climate of northern Japan throughout the year is colder than that of southern Japan. Hence the author is inclined to surmise that etiologic relations exist between the colder climate and the lower percentage of Prowazek bodies. Where Prowazek bodies were found, intense papillary exuberations of the conjunctiva were almost always present clinically. C. Zimmermann.

Rangachari, V. **A case of unilateral trachoma.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 97-99.

A fourteen-year-old boy presented himself with a typical follicular and papillary trachoma of the left palpebral conjunctiva and fornices without involvement of the bulbar conjunctiva or cornea and with the fellow eye normal. Two percent $AgNO_3$ and beta-radium rays locally with calcium gluconate, cod-liver oil and tuberculin B. E. effected a cure. Lawrence G. Dunlap.

Reese, F. M. **Meningococcus conjunctivitis followed by septicemia and beginning meningitis.** Amer. Jour Ophth., 1936, v. 19, Sept., pp. 780-782.

Satyanatham Pillai, A. **Leptothricosis conjunctivae and the Parinaud's syndrome.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 115-117.

The paper presented concerns itself with the question of diagnosis of Parinaud's conjunctivitis and gives a single typical case in a twenty-year-old married Hindu female.

Lawrence G. Dunlap.

Towbin, B. G., and Tkatschow, W. P. **On the X-ray treatment of trachoma and follicular conjunctivitis.** Folia Ophth. Orientalia, 1935, v. 2, Nov., p. 46.

The authors investigated the general effect of X-ray radiation on the course of trachoma. They radiated different parts of the body, the thigh, the spleen, or the back, but excluding the eyes. A single 60 percent skin-erythema dose was used in folliculitis, and four such doses in trachoma at one to two weeks intervals. Good subjective and objective results were achieved in folliculitis. Among the trachomatous patients only few improved, the majority remained unimproved. After radiation a focal reaction in the eyelid was repeatedly observed. R. Grunfeld.

Trapezontzeva, E. **Comments on Kolenko and Tarasova's article on "The Wassermann reaction in trachoma."** Sovietskii Viestnik Opht., 1936, v. 8, pt. 5, p. 748.

On the basis of personal experience, the author attributes to faulty technique the frequency of positive Wassermann reactions in trachoma reported by Kolenko and Tarasova.

Ray K. Daily.

Uchida, Yuzo. **On ocular disturbances due to intoxication with aspirin.** Folia Ophth. Orientalia, 1935, v. 2, Nov., p. 38.

Two patients, apparently because of aspirin idiosyncrasy, developed ophthalmia with marked swelling of the eyelids, conjunctival injection, lacrimation, and photophobia; to which in one case bullous keratitis was added. A skin eruption occurred at the same time. In each case a cold and albuminuria were present. Weakened resistance and temporary renal disturbance probably contributed to the drug idiosyncrasy.

R. Grunfeld.

Vito, P. **Conjunctivitis from verruca of the free lid margin.** Boll. d'Ocul., 1936, v. 15, June, pp. 627-634.

Three patients, 48, 41, and 21 years old respectively, were relieved of follicular or other acute inflammatory conjunctival symptoms after the extirpation of verruca of the lid. In one of two other persons instillation of a suspension of the triturated verruca in the conjunctival sac provoked an intense reaction which lasted for some time. The author thinks that this patient was sensitized to the virus of the verruca, and that these cases belong to the class of allergic conjunctivitis. (Bibliography.)

M. Lombardo.

6

CORNEA AND SCLERA

Barman, K. P. **Tuberculin and ultraviolet therapy in certain affections of the cornea.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 218-222.

The author gives five case reports of conditions diagnosed as tuberculous keratitis because of positive tuberculin reaction, extreme chronicity and resistance, resemblance to phlyctenular keratitis, and failure to find a second presumable cause. Ultraviolet light activates ergosterol to vitamin D, increases blood calcium and phosphorus, and increases the immunologic and bactericidal properties of the blood.

Lawrence G. Dunlap.

Biswas, P. K. **Groenouw's disease.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 126-131.

Nodular corneal opacity, first described by Groenouw in 1890, consists of numerous small rounded or crenated greyish non-confluent opacities in the otherwise clear corneal tissue. Familial corneal dystrophy, nodular keratitis, and lattice-shaped or grill-like opacity are other names which have been used. The lesions are a dominant inherited characteristic, congenital, and have been followed through three generations in several series of cases. The author reports three more cases. Two Hindu children, a brother aged fifteen and a sister aged eleven years, were seen with bilateral involvement, vision of about 0.1, seven years duration, clear corneal periphery, other media and fundi normal, slightly insensitive cornea and negative tuberculin test. Repeated scraping of the cornea did not improve the vision, but did demonstrate hyaline degeneration of the corneal epithelium. The etiology is still unknown, but may be (a) a hereditary form of degeneration of the superficial lamellae of the cornea, (b) neurotrophic, (c) tuberculous.

Lawrence G. Dunlap.

Borsotti, Ippolito. **Contribution to the knowledge of behavior of the reticulo-endothelium in repair of aseptic non-perforating wounds of the cornea.** Boll. d'Ocul., 1936, v. 15, June, pp. 635-648.

The histologic examination of rabbit eyes, enucleated at different stages after a non-perforating wound of the cornea had been provoked and vital coloring used by injection, demonstrated that colored reticulo-endothelial elements

migrated from the limbus to the seat of the corneal wound in the period of repair. (Bibliography, one figure.)
M. Lombardo.

Davidson, M. **Silicosis corneae.** Amer. Jour. Ophth., 1936, v. 19, Oct. p. 896.

De-Petri, M. **Contribution to the therapy of keratohypopyon.** Boll. d'Ocul., 1936, v. 15, June, pp. 658-678.

Nineteen cases of ulcer of the cornea, either simple or with hypopyon, eleven complicated by dacryocystitis, were treated with the electrocautery at low temperature, together with extirpation of the lacrimal sac in complicated cases. One cauterization gave immediate and satisfactory results in superficial ulcers, while two or more cauterizations were necessary in deep ones. There was no advantage over other treatments in corneal abscess or in very deep ulcer. Frequently cauterization is followed by iritis with obstinate miosis. (Bibliography.) M. Lombardo.

Feigenbaum, Aryeh. **On typical and atypical episcleritis metastatica furunculiformis and their relations to rheumatic episcleritis and to erythema nodosum.** Folia Ophth. Orientalia, 1935, v. 2, Nov., p. 27.

Three cases are described in each of which a furuncle was present or the patient gave a history of furunculosis. In the typical case the episcleritic focus suppurated, while in the two atypical cases furunculiform foci appeared alternatingly with nonsuppurating episcleritic foci in the same eye. In a fourth patient a very obstinately recurrent episcleritis and keratitis appeared with an abortive form of erythema nodosum, the etiology of which was possibly tuberculous. The episcleritic nodules are of metastatic origin and are equivalent to the efflorescences found on the skin in erythema nodosum, and in rheumatoids and tuberculids originating from a common focus of infection. R. Grunfeld.

Filatow, W. P. **The Filatow-Marzinkowsky trephines for corneal transplantation.** Klin. M. f. Augenh., 1936, v. 96, June, p. 756.

To avoid injury of the lens, prolapse of vitreous, and premature escape of aqueous, Filatow constructed various trephines which are described and illustrated. C. Zimmermann.

Fiore, Tito. **Some rare cases of keratoconus complicated with senile cataract and chronic simple glaucoma.** Boll. d'Ocul., 1936, v. 15, April, pp. 482-491.

The author gives the history of two old ladies, aged 63 and 72 years respectively, affected by bilateral keratoconus and cataract, and of a man affected by simple glaucoma. The cataracts were operated on with success. (Bibliography.) M. Lombardo.

Franceschetti, A., and Kiewe, P. **A new indication for partial, non-penetrating keratoplasty: familial hereditary corneal degeneration.** Schweiz. med. Woch., 1936, no. 22, May 30, p. 528.

The authors describe a case, the sixth member in three generations, of familial corneal degeneration in a patient 38 years old in whom bilateral keratoplasty was done. Vision before operation was 4/50 in the right eye and 3/40 in the left eye. Vision in the right eye ten months after operation was 5/7.5 with a —3.00 sphere. Vision in the left eye seven months after operation was 5/10 with —4.00 sphere. The corneal grafts were obtained from freshly enucleated globes.
Theodore M. Shapira.

Friede, Reinhard. **Full-thickness keratoplasty in total corneal dystrophy.** Zeit. f. Augenh., 1936, v. 89, Aug., p. 332.

Friede attempted full-thickness keratoplasty in three cases of total corneal dystrophy, and feels that his results do not justify the absolute pessimism reflected in the literature. In one patient, a modest improvement in visual acuity to 1/36 was gratefully adjudged a success by the patient. The second patient had retained a relatively clear cornea during the eight months since operation, with visual acuity of 6/24. In the

third patient the author attempted to graft an entire cornea. It remained clear for ten days but became entirely opaque when its lower edge was torn out during removal of sutures. However, the author believes that this corneal graft, though opaque, is a healthier substratum for a new and smaller graft. F. Herbert Haessler.

Holley, S. W. **Corneal reactions in tuberculin tests.** Amer. Jour. Pathology, 1935, v. 11, Nov., p. 937.

Corneal reactions of normal and tuberculous guinea pigs to tuberculoprotein and tuberculo-phosphatid were studied for one month. Both substances had a toxic effect on the cornea of tuberculous animals, but not on the cornea of normal animals. This toxic effect was manifested by inflammation and degeneration of the corneal tissue. In the tuberculous cornea according to the author, most of the mononuclear cells at the site of the injection are from the blood stream, and the epithelioid cells originate from these monocytes.
Theodore M. Shapira.

Kayser, B. **Histologic findings in true megalocornea globosa.** Klin. M. f. Augenh., 1936, v. 96, June, p. 721.

Supplementing his description of the external anatomic measurements (see Amer. Jour. Ophth., 1933, v. 16, p. 1125), Kayser gives the histologic findings of the only such eyeball that came to autopsy. They definitely prove that glaucoma plays no part in the development of this type of megalocornea, and that there is a true uncomplicated megalocornea in which the changes are confined to the anterior segment of the eyeball, especially as regards the shape of the cornea and incidental changes at the sinus of the anterior chamber and ciliary body. The changes are not secondary to inflammation or degeneration. Hence it is necessary to distinguish this true megalocornea from the secondary form. It is a mere anomaly of development. Macrophthalmos and megalocornea are entirely different conditions, which have in common an enlarged cornea. (Illustrations.)
C. Zimmermann.

Kraupa, E. **Conjunctival nodule in scleritis.** Zeit. f. Augenh., 1936, v. 89, Aug., p. 338.

The discovery of conjunctival nodules with tuberculous sc'eritis is usually credited to Axenfeld and Rupprecht, but Kraupa seeks to establish priority for Vossius by quoting six earlier references. F. Herbert Haessler.

Löwenstein, Arnold. **On lipoid infiltration in man and experimental animals.** Klin. M. f. Augenh., 1936, v. 96, June, p. 765.

By giving rabbits cholesterin in the food, an arcus lipoides of the cornea was produced directly at the limbus, not separated from it by a clear zone as in the human type. As to a boy (whose prematurely senile father had a broad arcus senilus) with very marked arcus lipoides the history revealed that his diet had been rich in fat and albumen and he had taken cod liver oil up to his twelfth year. In three other cases with unusual arcus lipoides the diet had been rich in fat. Two further cases of arcus lipoides juvenilis and increased cholesterin content of the blood presented general vascular disturbances which may have been related to intense cholesterinemia. In rabbits overfed with cholesterin regeneration of the corneal epithelium was not diminished, but the cornea was less resistant to staphylococcic infection. Cholesterin infiltrations are described in the corneal scars of two functioning eyes, for whose treatment hyperemia and reduced lipoid diet were recommended. The lipoid metabolism of all individuals presenting abnormal lipoid infiltrations in the cornea, especially arcus juvenilis, ought to be controlled, as early dietetic measures may perhaps favorably influence vascular affections and prevent premature senile changes, chiefly familial. (Illustrations.) C. Zimmermann.

Maury, F. H. **The pathology of lattice and nodular dystrophy of the cornea.** Amer. Jour. Ophth., 1936, v. 19, Oct., pp. 866-872.

Mukerjee, S. K. **A case of blue sclerotics as a result of congenital syphilis.**

Proc. All-India Ophth. Soc., 1935, v. 4, pp. 134-135.

Although blue scleras are rare in India, the author saw three cases in six months. Abnormal thinness of the sclera with defective deposition of calcium salts, and positive Wassermann and Kahn tests, was found in an eighteen-year-old Hindu girl and a younger and an older brother. Other signs of congenital syphilis were present.

Lawrence G. Dunlap.

Muthayya, R. E. S. **Two cases showing a small superficial opaque white ring in the cornea.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 122-123.

The described rings (not larger than 2 mm.) are composed of tiny round spots which are compared with drusen. One ring occurred in the cornea of a 55-year-old Hindu female with mature senile cataracts. No fundus study was made to determine the presence or absence of degenerative changes in the posterior segment. The ring consisted of a belt of little opaque white droplets at or about the level of Bowman's membrane, and it suggested lipoid degeneration. Another Hindu woman of about 55 years, while on the operating table for a cataract extraction, was found to have such a ring. The above condition, or Coats's ring, apparently differs from those described by Gradle in being permanent and from those described by Vogt in being made up of droplets instead of rod-shaped opacities.

Lawrence G. Dunlap.

Narayanaswami Nayudu, G. J. **Keratomalacia.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 68-75.

Half of this paper is bibliography on avitaminosis causing keratomalacia. It disagrees entirely with the contentions of English workers that keratomalacia cases are more susceptible to infections by pyogenic organisms than are other hospital patients.

Lawrence G. Dunlap.

Raja Iyer, D. **Corneal opacities due to sugar of lead.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 124-125.

Use of irritant remedies is one of the great causes of preventable blindness in South India. Lead incrustations are not uncommon. The usual sites for lesions due to irritant remedies are the lower part of the cornea and the lower cul-de-sac. Lead acetate and human milk treatment of a male Hindu aged 30 years produced opacities of a dense Chinese-white color with a porcelain-like quality, deposited not deeper than Bowman's membrane. Vision was reduced in 24 hours to fingers at 3 m. and hand movements respectively in the right and left eyes.

Lawrence G. Dunlap.

Rangachari, V. **Buphthalmos and blue sclerotics.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 136-138.

A Hindu boy aged thirteen years, the only atypical or unhealthy child of a family of seven, presented himself with blue sclerotics and a left buphthalmos. The left cornea measured 14 mm. (the right, 11 mm.), showed tears in Descemet's membrane, deep anterior chamber, and increased tension, with no vision. There was no lens dislocation or iridodonesis. Intracranial lesions should be searched for in such cases.

Lawrence G. Dunlap.

Rezende, Cyro de. **Syphilitic gumma of the sclera.** Rev. de Ophth. de São Paulo, 1936, v. 4, May, pp. 283-286.

The patient, a young man of eighteen years, had received 914 several months earlier on account of a primary lesion. No secondaries had been experienced. The ocular disturbance affected the vision, and appeared externally as a red elevation, about the size of a kidney bean, lying next to the cornea between the one and five o'clock positions. It was perfectly smooth and entirely covered by conjunctiva. After a positive Wassermann, further antisyphilitic treatment caused rapid improvement and cure. W. H. Crisp.

Richman, Frances. **Spontaneous rupture of the sclera (tuberculous).** Amer. Jour. Ophth., 1936, v. 19, Sept., pp. 792-794.

Rolett, D. M. **Contact glass as a therapeutic agent in corneal ulcers.** Amer. Jour. Ophth., 1936, v. 19, Oct., pp. 888-890.

Rubino, A. **A special form of bilateral corneal ectasia not before described.** Boll. d'Ocul., 1936, v. 15, June, pp. 649-657.

After a facial trauma, both corneas of a man of 25 years changed shape so as to form an acute angle at the horizontal meridian. To the slitlamp the corneas appeared to be very thin along the angle and numerous striations reached this line. As cause the author accepts a dystrophic state of the cornea. (Bibliography, 3 figures.) M. Lombardo.

Satyanatham Pillai, A. **Corneal ulcer due to fungus glenospora graphii.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 118-119.

After a second lacrimal-sac operation on a male Hindu aged 35 years for discharge of two years duration, a disturbed bandage still unchanged on the sixth day caused a corneal ulcer in the inferior nasal quadrant. The whole gamut of corneal ulcer therapy was applied to the patient and after two months the ulcer was definitely healing. The laboratory reported glenospora graphii. This is the second case ever reported of corneal ulcer due to this fungus. Lawrence G. Dunlap.

Viswalingam, A. **A case of sclerosing keratitis profunda.** Brit. Jour. Ophth., 1936, v. 20, Aug., pp. 449-455.

The patient came in October, 1931, with sore eyes and photophobia, pupils active to light, anterior chamber slightly shallow, tension not raised, filtration angle crowded. The general health of the patient was good aside from "gravel" in the urine and a calculus passed some years previously. The condition in the left eye advanced until enucleation was necessary in November, 1935. Pathological, macroscopic, and microscopic reports of the globe revealed sclerosing keratitis profunda with secondary glaucoma. Seven drawings, and three photomicrographs.

D. F. Harbridge.

Wood, D. J. **Inflammatory disease in the eye caused by gout.** Brit. Jour. Ophth., 1936, v. 20, Sept., pp. 510-519.

By means of four cases the author demonstrates the part seemingly played by gout as a cause or complication in certain eye diseases. The onset of the trouble was an attack of episcleritis fugax. In three cases tenonitis was present. Proof that gout is a principal cause is negative in part at least. The four cases demonstrate that effective treatment must be early and drastic and administered with the patient's coöperation. (7 photomicrographic illustrations.)

D. F. Harbridge.

7

UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Biozzi, Giuseppe. **Contribution to histologic knowledge of Fuchs's heterochromia.** Boll. d'Ocul., 1936, v. 15, June, pp. 683-698.

In histologic examination of eight pieces of iris from eyes affected by Fuchs's heterochromia, the writer found constant inflammatory changes due to infiltration by lymphocytes and eosinophiles and migration of cellular elements to the surface of the stroma with formation of true efflorescences. In some cases there were fibrillary changes in the pars pupillaris, with slight vascular sclerosis and proliferation of adventitious elements. Regressive changes and involution of chromatophores, spots of atrophy of the sphincter, and cystoid degeneration of the pigment epithelium were also encountered. (Bibliography, 7 figures.)

M. Lombardo.

Brons, C. **Cavernous angioma of the choroid.** Klin. M. f. Augenh., 1936, v. 97, July, p. 43.

Only eleven cases of hemangioma of the choroid have been accessible to ophthalmoscopic examination. A man of 41 years stated that the vision in his right eye had decreased for several weeks. A grayish opacity of 2-D. prominence extended from the optic disc to the macula, and over it coursed a blood

vessel with two branches. The surrounding retina was unchanged. Vision was 1/24. After three years the eye had become blind and showed detachment of the retina. Two years later it developed iritis with secondary hypertension and great pain, and was enucleated. Histologic examination revealed hemangioma of the choroid. Of the diagnostic points according to Mulock-Houwer, which are here discussed in detail, the simultaneous presence of nevi on the face and other parts of the body is undoubtedly the most important. (Illustrations.)

C. Zimmermann.

Brown, A. L. **Experimental uveitis: "interference" effect of parenteral administration of proteins on sensitization of the uveal tract.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 435-450.

The anterior chambers of rabbits' eyes were injected with equal and unequal amounts of horse serum and egg white in order to observe the multiple sensitization and the production of "interference" reactions in relation to the quantity injected and the length of time following the injection. It was found that the large amount of protein inhibited ocular sensitization from a smaller amount of different protein injected later. Also, the quantity of the protein was more important than the time of injection. Typhoid vaccine was then used as the "interference" protein, and there was a decided reduction in intensity of the ocular reactions. Various methods, which included putting glycerin in the anterior chamber, and subconjunctival insertion of catgut soaked in the vaccine, were used to raise the aqueous typhoid-antibody titer in generally immune animals.

C. Allen Dickey.

Bücklers, Max. **Curing sympathetic ophthalmia with atophanyl and cylotropin.** Klin. M. f. Augenh., 1936, v. 96, June, p. 725.

Ten cases of sympathetic ophthalmia are reported in detail. Eight could be considered completely cured by intravenous injections of atophanyl or cylotropin. Atophanyl is available in ampoules of 10 c.c., each containing 0.5 atrophan-sodium and 0.5 salicylate of sodium. Cylotropin in an ampoule of 5 c.c. consists of 40 percent urotropin, 16 percent sodium salicylate, and 4 percent caffein-sodium salicylate. The efficacy of these substances is still more marked in acute metastatic iritis, infections after perforating injuries, panophthalmitis, iritic glaucoma, and scleritis. They also have an anodyne influence.

C. Zimmermann.

Koman Nayar, K. **Sympathetic ophthalmia.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 202-210.

Of the total number of hospital patients seen in the past fifteen years, fifteen, 0.003 percent, had sympathetic ophthalmia. Some cases followed penetrating injuries and others were post-operative. The condition is apparently mild, as well as rare, in India. Two post-traumatic and two post-operative cases were seen in the past year, presenting the classical uveal picture. In one case, in the anterior segment, there was only a mild uveitis, but there was severe choked disc surrounded by flame-shaped hemorrhages.

Lawrence G. Dunlap.

8

GLAUCOMA AND OCULAR TENSION

Bagchi, S. K. **Importance of the study of field of vision on prognosis and treatment of epidemic dropsy glaucoma.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 172-175.

The author mentions the dropsy epidemics of 1926, 1927, 1929, 1930, and the most severe from the standpoint of eye complications, that of 1934. The province of Bengal was severely affected. One case with normal central vision and intraocular tension, field, and disc developed a tubular field of vision in three months while under observation. In another case the intraocular tension remained high (36 to 67 mm. Hg) for two months without any disturbance of the peripheral field. The author concludes that high tension is not in itself an indication for surgical intervention in the glaucoma of epi-

demic dropsy, that the nerve head can withstand pressure for a long time, that in this particular type of glaucoma medical treatment with miotics and saline purging are to be used so long as the field shows no contraction, and that intraocular pressure has no relation to systemic pressure.

Lawrence G. Dunlap.

Bencatarangam Nayudu, T. **Glaucoma, some clinical types.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 155-159.

The authors present a theory of an anterior and a posterior segment type of chronic primary glaucoma. They assume the posterior segment type to be due to increase of vitreous volume which gradually encroaches on the aqueous bed on the one hand, and the vascular bed on the other. In the anterior segment type, they believe that, although the same sort of vitreous swelling takes place, for some reason the aqueous can not escape at the angle. Lawrence G. Dunlap.

Bhaduri, B. N. **Some uncommon ocular complications in epidemic dropsy.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 160-171.

After the first appearance of epidemic dropsy in Calcutta in 1877, thirty years elapsed before ocular manifestations were recognized. The one serious complication is glaucoma. Of the 15,500 new cases seen in the Carmichael Medical College Ophthalmic Outpatient Department, Calcutta, in 1934, two and five tenths percent were epidemic dropsy cases, and thirty percent of these showed ocular manifestations. Besides glaucoma, extraocular and intraocular hemorrhages are discussed at length, also "swelling of the optic disc." (Tables.)

Lawrence G. Dunlap.

Duke-Elder, S., Davson, H., and Benham, G. H. **The swelling pressure of normal and glaucomatous vitreous bodies.** Brit. Jour. Ophth., 1936, v. 20, Sept., pp. 520-527.

Basing their findings upon normal, dialyzed, KCNS-treated ox-vitreous bodies; on a human glaucomatous vitreous, and on a vitreous from a freshly enucleated eye, the authors determine that the swelling pressure of the vitreous body cannot be the cause of chronic primary glaucoma. The results convince them that the swelling pressure is not of a degree to account for the raised tension. The principle of the apparatus is discussed and demonstrated, eliminating any valid objection to the method employed. (2 figures.)

D. F. Harbridge.

Dutt, S. C. **A short history of incidence of glaucoma in Bengal.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 176-183.

Cases of epidemic dropsy, or Bengal glaucoma, seen at the Calcutta Medical College Eye Infirmary in less than ten years numbered over 3,300, while in a like period at Moorfields hospital, London, 924 cases were seen. A correctly performed trephine operation gives immediate and permanent relief in nearly all cases. In the past ten years, ninety per cent or more of such cases were of the chronic simple variety. Epidemic dropsy apparently results from ingestion of a particular rice.

Lawrence G. Dunlap.

Meyer, K., and Palmer, J. W. **On the nature of the ocular fluids.** Amer. Jour. Ophth., 1936, v. 19, Oct., pp. 859-865.

9

CRYSTALLINE LENS

Ballantyne, A. J. **"Posterior needling" in the treatment of lamellar and other forms of soft cataract.** Brit. Jour. Ophth., 1936, v. 20, Sept., pp. 540-544.

The author presents illustrative cases of congenital and juvenile cataract. By this method there is no need for a general anesthetic. The patient may continue ambulant. The risk of retinal detachment is small compared with the real dangers incident to the anterior operation. D. F. Harbridge.

Barkan, H., Borley, W., Fine M., and Bettman, J. **Operative results in cataracts coincident with dinitrophenol**

therapy. California and West. Med., 1936, v. 44, May, p. 360.

The authors present 24 cases operated upon and conclude that the prognosis is good for useful vision.

Theodore H. Shapira.

Chatterjee, N. **Treatment of immature senile cataract.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 139-146.

The author is unalterably opposed to any method of cataract extraction other than the Smith intracapsular. He regards the patient as fit for operation as soon as he is unfit for his occupation, irrespective of the degree of lenticular degeneration. Medical treatment has no proved value.

Lawrence G. Dunlap.

Hahn, W. **The treatment of cataract in history.** Jour. Med. Soc. New Jersey, 1936, v. 33, Jan., p. 7.

Reviewing the treatment of cataract through the ages, Hahn does not believe that medical treatment for its removal will be successful.

Theodore M. Shapira.

Kraupa, E. **Fire cataract.** Zeit. f. Augenh., 1936, v. 89, Aug., p. 337.

A historical note. Fire cataract is first mentioned by the surgeon, Heister, in his Institutiones Chirurgicae in 1739. This note has escaped historians like Hirschberg because it did not appear in the first edition.

F. Herbert Haessler.

Mohan Lal, A. **Routine of cataract extraction as followed in the Mohan Eye Hospital, Aligarh.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 147-152.

Some Indian surgeons perform as many as fifty cataract extractions per hour. Desire for better results and fewer secondary cataracts caused the author to adopt the intracapsular method, using the Knapp-Stanculeanu-Török technique. In 250 cases he had only one case of iridocyclitis and three or four cases of iris prolapse. Morgagnian cataract is the only contraindication. The conjunctival flap incision is used, later putting in a single human-hair suture, which is very soft and does not irritate the eye. After Kalt-capsule-forceps lens delivery, a Hess peripheral iridectomy is made. Preliminary preparation includes lacrimal syringing. One percent eserin follows the operation and the patient walks to bed.

Lawrence G. Dunlap.

Pereira, R. F. **A statistical study of senile cataract operations at the Hospital Nacional de Clinicas eye service.** Arch. de Oft. de Buenos Aires, 1936, v. 11, May, p. 281.

For the last five years 410 senile cataract operations are recorded. Glaucoma as a complication appears more frequent in those without iridectomy, and among them iris prolapse is also more common. The intracapsular method seems to be giving ground to the extracapsular method in this five-year period. Occlusion of the eye is made more certain by a suture in the skin of the upper lid fastened with adhesive to the cheek. The author's modified Elschnig capsule forceps has the concavity backward in order to obscure the field of operation as little as possible. M. Davidson.

Puscariu, E., and Nitzulescu, J. **Cataracta brunescens—study of the nature of the coloring substance.** Brit. Jour. Ophth., 1936, v. 20, Sept., pp. 531-540.

Among 1,357 cases the authors found but four of the cataract type under discussion and only one of these with myopic eyes. The age range was 52 to 62 years. The only postoperative complication was a secondary pigmentary cataract. The vision, however, remained reduced. Two lenses from the fourth case were studied chemically, showing the pigment to be closely related to melanin. The same process of pigment accumulation is suggested as in brown atrophy of heart and muscles. (4 tables.) D. F. Harbridge.

Rauh, Walter. **Lentiglobus anterior.** Zeit. f. Augenh., 1936, v. 89, Aug., p. 321.

Rauh's patient was a 48-year-old man in whom this rare affection had

arisen when he was in his early forties. The author refers to thirteen other cases reported in the literature and points out that in three of these as well as his own a kidney lesion coëxisted. The cause of the lenticular change is still obscure. F. Herbert Haessler.

Rodin, F. H. **Cataracts following the use of dinitrophenol.** California and West. Med., 1936, v. 44, April, p. 276.

Rodin reviews 32 cases of dinitrophenol cataract. The average age of the patients affected was 45 years. The youngest was 30, the oldest 67. The length of time that the drug was taken was three months to two years. In 27 patients cataracts appeared within fifteen months. The length of time the drug is taken is not a factor in the production of the lens opacities.
Theodore M. Shapira.

Rundles, W. **Dinitrophenol cataract.** Jour. Michigan State Med. Soc., 1935, v. 34, Dec., p. 777.

Rundles reports a case of dinitrophenol cataract in a 48-year-old female who took the drug for reducing purposes. Theodore M. Shapira.

Shankara Menon, K. C. **Uncommon complications in cataract extraction.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 153-154.

Case one had expulsive hemorrhage of the anterior segment four days after uncomplicated extracapsular extraction with peripheral iridectomy and conjunctival flap. The conjunctival blood was cleared away. A month later the patient was discharged with a round pupil, clear vitreous, normal fundus and 6/36 vision. Case two was one of extracapsular cataract extraction. While irrigating the anterior chamber, an apparent curled translucent capsule remnant was seen and grasped. The whole lining of the cornea peeled off. A diffuse haze in the upper half of the cornea cleared in fifteen days, with 6/36 vision. One discusser of the paper told of accidentally irrigating the anterior chamber with 1 to 40 carbolic acid, which destroyed the endothelium and caused a ground-glass cornea. Another used $HgCl_2$, 1 to 6000, with a like result. Lawrence G. Dunlap.

Thompson, R., Gallardo, E., and Khorazo, D. **Precipitins in the ocular tissues of rabbits generally and locally immunized with crystalline egg albumin.** Amer. Jour. Ophth., 1936, v. 19, Oct., pp. 852-858.

Whalman, H. F. **Dinitrophenol cataract.** Amer. Jour. Ophth., 1936, v. 19, Oct., pp. 885-888.

Wright, R. E. **Incidence of cataract at certain age periods in South Indian districts.** Brit. Jour. Ophth., 1936, v. 20, Sept., p. 545.

The author offers the findings of the Indian Research Fund Association for answer to the frequent query why cataract is so common in India. Of 2,000 outdoor workers 40 to 60 years old in an arid district, one in 5.1 had cataract. Of the same number of workers of the same age range in a more humid fertile district, one in 3.4 had cataract. Apparent, rather than actual, ages were given, so that the patients probably looked much older than their years.
D. F. Harbridge.

10

RETINA AND VITREOUS

Avizonis, P. **Personal experiences with treatment of retinal detachment by diathermy coagulation.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 366-370.

A blunt electrode is applied to numerous points over the region of the detachment, a current of 24 to 25 ma. being utilized for two or three seconds at each point. A needle electrode is finally used to perforate the sclera. The causes of detachment and the types of tear are described. Forty-nine operations were done on 33 eyes of 32 patients. Complete cure was effected in 23 cases, eight cases were partially relieved. The complications were severe iritis, and in five cases vitreous opacity.
P. J. Leinfelder.

Bailliart and Schiff-Wertheimer. **Considerations on one hundred cases of detachment of the retina operated upon by diathermy coagulation.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 373-379.

All the cases were treated in the same manner—blunt electrode followed by needle perforation. The technique is well tolerated, it is simple, and observation with the ophthalmoscope is easy. The authors believe this method to be the best for obliteration of tears whether disinsertions of the ora serrata or very fine ruptures. It is not sufficient, however, in tears situated on the elevation of the detachment, in ragged folded tears, or in tears in the macular region. Of the one hundred operations cures were obtained from 56, no result in 36, some benefit in the remaining eight. P. J. Leinfelder.

Barondes, R. de R. **Glycerol trinitrate (nitroglycerine) in the treatment of hemeralopia (night-blindness).** Brit. Jour. Ophth., 1936, v. 20, Sept., pp. 528-531.

To the usual causes of night-blindness the author would add another—a circulatory disturbance or dysfunction causing spasticity of the retinal arteries and capillaries. Under this condition there is a deficiency of blood supply to the light-perceiving layer of the retina. The author's findings are based on five adult cases of night-blindness, experiments being carried on with various vasodilating drugs. Nitroglycerine proved the most helpful of the drugs administered, coated tablets being used to maintain the proper dosage. Its effect on the central nervous system and on the blood pressure, however, suggests care in its administration. D. F. Harbridge.

Bietti, G. B., and Lugli, G. **Researches on the behavior of the naso-retinal reflex.** Riv. Oto-Neuro-Oft., 1936, v. 13, Jan.-Feb., pp. 66-92.

The reflex was found in 85 percent of normal cases. With the ophthalmodynamometer the arterioretinal pressure was found increased in 34 cases and decreased in six cases. With the endoptoscope the course of the red cells was seen to be slower than normal and their shape roundish. The reflex is between the trigeminal endonasal terminations and the sympathetic filaments reaching the retinal blood vessels. Its existence suggests the influence that stimuli from the nasal mucous membrane may have on the retinal circulation in ocular pathology. The author suggests an attempt at modifying the circulation of the retina and optic nerve by way of the nasal mucous membrane. (Bibliography.) M. Lombardo.

Chitnis, V. K. **Diathermy in treatment of detachment of retina.** Bombay. Folia Ophth. Orientalia, 1936, v. 2, April, p. 107.

Among the 53 patients with detached retina who presented themselves for treatment 30 were operated upon according to Larsson's surface coagulation method and 50 percent of cures were obtained. The remaining cases were rejected as unsuitable for operation. R. Grunfeld.

Coppez, Léon. **Improvement in technique of pyrometric diathermy coagulation in treatment of detachment.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 385-391.

Only by heating to 80°C. is an adequate reaction obtained. The electrode must be held in one place for thirty seconds. Temperature and not milliamperage is the guide in therapy. When needle punctures are called for a modified pyrometer serves the double purpose. Special considerations are discussed. P. J. Leinfelder.

Espildora Luque, C. **Retinal angioscopy in the hypertension and the retinitis of pregnancy.** Arch. de Oft. de Buenos Aires, 1936, v. 11, May, p. 272.

Retinal angioscopy permits differential diagnosis between true eclampsia of pregnancy and pseudoeclampsia of renal origin. The former does not exhibit any alteration of the vessel wall but abundant retinal exudates. (6 case reports.) M. Davidson.

Friedenwald, J. S., and Stiehler, R. D. **The structure of the vitreous.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 237-265. (See Amer. Jour. Ophth., 1936, v. 19, April, p. 363.)

Gallois, Jean. **Notes on the medical problem of detachment of the retina.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 300-303.

It must be remembered that there are other causes of detachment of the retina besides retinal tears. The author cites detachment occurring in uveitis, renal retinitis, endocrine disturbances, modification of retinal circulation, hypothyroidism, and migraine. Careful general examination is as important in treatment as a search for tears.

P. J. Leinfelder.

Gallois, J., and Giroux, R. **Retinal angioscopy and early diagnosis in cardiovascular pathology.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 289-293.

Enlargement of the arteries is frequently associated with arterial hypertension and has led to diagnosis of a general hypertonic state with dilatation of the aorta in four patients. Perivascular changes in young patients are indicative of spasm of the arterial system, and in two cases the authors were able to recognize an unsuspected underlying aortic lesion.

P. J. Leinfelder.

Goerlitz, Martin. **Detachment of the retina and pregnancy. Further experiences with operative treatment of retinal detachment.** Klin. M. f. Augenh., 1936, v. 97, July, p. 22.

Goerlitz reports on his 56 further cases (87 in all); 48 operated on according to Weve's method with complete success in 26; four according to Gonin, all successful; four according to Safar and Vogt. A series of detailed clinical histories show that even extensive, apparently almost hopeless, detachments and cases complicated by severe general disease or by pregnancy can be cured by this operation. The value of Weve's operation does not exclude Gonin's ignipuncture in certain cases with small well localized and accessible tears. Goerlitz demonstrates on a case that detachment in a very myopic eye during pregnancy without toxicosis and without related retinal changes is not an indication for interruption of pregnancy. (Illustrations.)

C. Zimmerman.

Gradle, H. S., and Meyer, S. J. **The surgery of retinal detachment.** Amer. Jour. Ophth., 1936, v. 19, Oct., pp. 873-881.

Guillot, P. **Retinal tears without detachment.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 317-322.

In three cases of retinal tear in myopes there was no retinal detachment. This was attributed to the sealing effect of localized areas of choroiditis that surrounded the tears. The authors believe this to be a sign that the tear will not progress, but if the retina is wavy or presents a hammered appearance the prospect is that detachment will occur.

P. J. Leinfelder.

Hildesheimer, Shalom. **Strip-like scleral excision and subsequent cauterization with caustic potash in retinal detachment.** Folia Ophth. Orientalia, 1935, v. 2, Nov., p. 12.

For treatment of retinal detachment the author combined the Lindner-Guist chemical cauterization method with shortening of the coats of the eyeball. A scleral strip is excised with a loop-shaped electrical knife at the site of the hole. Having assured himself by animal experimentation of the easiness of performance and of the safety of the operation, the author treated fifteen patients by this method. Complete cure was obtained in six cases. In three cases partial detachment remained, but the process came to a standstill. Six cases remained unimproved.

R. Grunfeld.

Holloway, T. B., and Fry, W. E. **Vitreous detachment, anterior dialysis, and over the optic nerve a tumor-like mass consisting of the detached retina.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 209-219.

A patient aged 22 years received a severe blow on the back of the head. Two weeks later the left eye became inflamed, and at the end of three months the vision was lost. On examination a large whitish mass was found made up of convolutions suggesting the appearance of the frontal lobe. The tension was 17 mm. Hg (Schiötz). The eye was removed. The vitreous was almost completely detached and occupied the anterior half of the vitreous cavity, and the tumor mass, which was the completely detached retina, covered the papilla and extended 8 mm. forward from it. Marked cystic degenerative changes were found in the detached retinal mass. A detailed microscopic study of all tissues of the eye is included. C. Allen Dickey.

Igersheimer, Josef. **Peculiar relations between the brain and the eye.** Folia Ophth. Orientalia, 1936, v. 2, April, p. 115.

There exist diseases of the brain documenting themselves in diffuse ganglion cell degeneration and clinically in impairment of intelligence that are accompanied by a disease of the retina, either by degeneration of the optic nerve ganglion as in Tay-Sachs disease, or by degeneration of the retinal ganglion as in the juvenile form of amaurotic family idiocy, or in the Lawrence-Biedl syndrome. Atypical cases were also observed by the author. In a child with adiposogenital dystrophy fine pigmentation along the retinal vessels was noted, an atypical retinitis pigmentosa. In another child with adiposogenital dystrophy the vision was greatly reduced and the patient complained of hemeralopia, pointing to disease of the rods and cones. The third case was one of acromegaly with chorioretinitis pigmentosa and hemeralopia, with greatly reduced vision and contracted visual fields. The fourth case was one of adiposogenital dystrophy with spiderweb pigmentation of the retina, optic nerve atrophy, and homonymous hemianopia.

R. Grunfeld.

Jeandelize, Baudot, and Gault. **Aphakia and detachment of the retina.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 305-316.

Nine cases of detachment of the retina following cataract extraction were observed, the interval varying from five months to 48 years. A number of the patients were myopes, and no relationship existed between the occurrence of detachment and the type of cataract extraction. The prognosis for cure is poorer in aphakic eyes. The authors were successful in one of four cases in which a tear was seen, and in two of five in which a tear could not be seen.

P. J. Leinfelder.

Kirwan, E. O'G. **The treatment of retinal detachment with an analysis of seventeen cases.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 187-199.

The author discusses the various operations, including those of Gonin, Guist, Larsson, Weve, and Safar. At the Eye Infirmary, Medical College, Calcutta, the Larsson method is used. Of seventeen cases reported in detail, 41 percent recovered with improved vision and 18 percent without improved vision, and 41 percent were failures.

Lawrence G. Dunlap.

Koman Nayar, K. **Von Hippel's disease.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 200-201.

After a four-year interval a further report is made on a case previously referred to in the Report of the Government Ophthalmic Hospital, Madras, 1928, p. 14. Lawrence G. Dunlap.

López Enríquez, M. **Recent cytologic research on the pathologic vitreous.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 298-299.

In pathologic conditions cells migrate to the vitreous which are not unlike the cells described by Hortega in various diseases of the brain, retina, and optic nerve. Their presence is not indicative of a specific malady.

P. J. Leinfelder.

Mawas, Jacques. **Pathologic histology of retinal detachment.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 345-347.

In all cases the author finds lesions in the pigment epithelium and vascular disturbances. Most cases show exudation or hemorrhage. The vitreous does not play any primary part in causing detachment. Tears are not formed except in idiopathic detachment, and then they are the result of local retinal disease (retinomalacia polycystica). Vitreous floaters of retinal origin precede detachment, and in recent cases the subretinal fluid is entirely different from vitreous. P. J. Leinfelder.

Meyerbach, Fritz. **Retinitis pigmentosa and internal secretions.** Folia Ophth. Orientalia, 1935, v. 2, Nov., p. 59.

Encouraged by the improvement achieved with menformon, an ovarial preparation, in treatment of retinitis pigmentosa, the results of which were published in an earlier paper (see Amer. Jour. Ophth., 1934, v. 17, p. 575), the author continued to treat the same patient with increased doses of menformon. Further improvement in vision and enlarged visual fields were obtained. R. Grunfeld.

Mukerjee, S. K. **Ocular affections in diabetes.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 86-94.

After the usual discussion of ocular complications of diabetes, the author questions the statement that retinal diabetic changes are due to concomitant renal defects.

Lawrence G. Dunlap.

Noelle-Chomé-Bercious. **Detachment of the retina and postoperative hemorrhage.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 323-325.

Three cases had intraocular hemorrhage following thermocauterization or diathermy puncture for detachment of the retina. The hemorrhages occurred on the third day, on the twelfth day, and in five months respectively, and the author attributes them to absorption of a blood clot formed during treatment. Intervention in the region of the vortex veins, as was necessary in the author's case, may have influenced the occurrence. P. J. Leinfelder.

Pereira, R. F. **Six Safar operations for detachment of the retina.** Arch. de Oft. de Buenos Aires, 1936, v. 11, May, p. 315.

This series, in addition to that of fifteen reported previously, confirms Pereira's enthusiasm for surgical intervention. M. Davidson.

Pesme, Paul. **A pyrometric controller with variable zero for ocular diathermy.** Bull. Soc. Franç. d'Opht., 1935, v. 48, pp. 361-365.

In the author's instrument a thermocouple incorporated with the electrode is connected with a galvanometer that is graduated in degrees. At the start of the operation the galvanometer is adjusted to read the same as the room temperature. Either a flat scleral electrode or a point for perforation may be used. P. J. Leinfelder.

Pillat, A. **Superior vitreous detachment.** Klin. M. f. Augenh., 1936, v. 97, July, p. 60.

Pillat describes and illustrates the morphologic features of superior vitreous detachment observed in a woman of 61 years, 14 and 24 days after successful intracapsular extraction of cataract in the respective eyes. Three important new types of superior vitreous detachment are discussed in detail. One, in the shape of a tent, may lead to retinal detachment. The subjective complaints of lightning flashes and seeing sparks find their explanation in those cases where circumscribed synechiae between retina and vitreous prevent total detachment of the vitreous. (Illustrations)

C. Zimmermann.

Polack, A. **Diathermy and thermopuncture in retinal detachment.** Bull. Soc. Franç. d'Opht. 1935, v. 48, pp. 392-394.

The author concludes that Gonin's thermopuncture gives more lasting re-

sults and more firm scar tissue, and is to be preferred in all cases to which it is applicable. P. J. Leinfelder.

Prigozhina, A. L. **Hereditary degeneration of the macula lutea.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 6, p. 820.

A review of the literature and brief reports of five clinical cases.

Ray K. Daily.

Sen, K. **Night blindness and vitamin-A deficiency.** Proc. All-India Ophth. Soc., 1935, v. 4, pp. 76-81.

Sen gives a historical account of night blindness, which he considers due to disturbed regeneration of visual purple. Cases have been cured in twelve hours even with one dose of cod liver oil. Nine cases were cured in an average of one week on cod liver oil. Three cases taking an average of twelve carrots daily were cured in 20 to 25 days. Catarrhal jaundice cases were found to have night blindness, which was cured when the jaundice was cured.

Lawrence G. Dunlap.

Tristaino, L. **Jensen's juxtapapillary retinochoroiditis.** Boll. d'Ocul., 1936, v. 15, April, pp. 431-436.

In answer to a criticism of his previous article the author states that typical Jensen's retinochoroiditis is located at the nasal side of the disc and connected with it; causing typical sector scotoma with its apex toward the blind spot. Typical Jensen's disease shows also more or less intense edema of the papilla, which demonstrates that it starts and develops from the sheaths of the optic nerve. Cases which do not reproduce the characteristic symptomatology in regard to the seat of the lesion and the number of foci are to be considered as atypical.

M. Lombardo.

11

OPTIC NERVE AND TOXIC AMBLYOPIAS

Sobánski, J. **Depression therapy of tabetic atrophy of the optic nerve.** Klin. M. f. Augenh., 1936, v. 97, July, p. 1.

Depression therapy aims to regulate the circulation of the retina and of the intraocular portion of the optic nerve by decreasing intraocular tension and increasing the general blood pressure. For depressing intraocular tension pilocarpin was used and in some cases cyclodialysis was performed. As blood-pressure tonics intravenous injections of strychnine, neurotonin, hormotone, or triplex quadrotone were given during interruption of antiluetic treatment. Of the 37 patients thus treated so far, 13 had one blind eye each. In 40 eyes of 31 cases improvement was obtained, in 11 none. Ten eyes finally showed deterioration of vision, four of them after transient improvement. The time of observation varied between twenty months and less than one year. Seven clinical histories are given in detail. (Illustrations.)

C. Zimmermann.

12

VISUAL TRACTS AND CENTERS

Farberov, B. E. **Roentgenologic and ophthalmologic signs in tumors of the hypophysis.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 6, p. 846.

A detailed interpretation of roentgenograms and ophthalmoscopic findings in pituitary tumors.

Ray K. Daily.

Johnson, T. H. **Homonymous hemianopia: Some practical points in its interpretation, with a report of forty-nine cases in which the lesion in the brain was verified.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 90-113. (See Amer. Jour. Ophth. 1936, v. 19, Sept., p. 823.)

13

EYEBALL AND ORBIT

Klijkova, A. L. **Mucocele of the fronto-ethmoidal sinus.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 6, p. 859.

A report of a case which was operated on and made a complete recovery with conservation of normal vision.

Ray K. Daily.

Puglisi-Duranti, Giovanni. **Unilateral microphthalmos and ribbon opac-**

ity of the cornea. Boll. d'Ocul., 1936, v. 15, May, pp. 535-550.

The congenitally small right eye of a girl of eleven years was enucleated because of inflammation. The eyeball showed absence of the optic nerve, ribbon opacity of the cornea, a gliomatous mass in the vitreous, atypical incomplete coloboma of the iris up and nasally, atypical temporal coloboma of the choroid, ossification of the choroid, ossification near the ectopic lens, and partial obliteration of the angle of the anterior chamber. In view of the age of the patient, the author is of the opinion that the inflammatory symptoms were secondary to the internal condition of the eye. (Bibliography, 9 figures.) M. Lombardo.

14

EYELIDS AND LACRIMAL APPARATUS

Hagedoorn, A. **Senile keratoma.** Klin. M. f. Augenh., 1936, v. 96, June, p. 816.

A man of 56 years presented in the skin of the upper lid a flat hard movable tumor the size of a bean. It looked like a scab. Removed through an incision in the healthy parts, it was found to be free from muscles and tarsus. Histologically it was characterized by parakeratosis and hyperkeratosis, irregularity of the epithelium, pathologic cell forms, and absence of pigment. The condition occurs on the uncovered parts of the body and is related to senile verruca, which is more often found on the trunk. (Illustrations.)

C. Zimmermann.

Kattan, M. A. El. **Leishmaniasis of the eyelids and conjunctiva in Egypt.** Bull. Ophth. Soc. Egypt, 1935, v. 28, p. 12.

Cases of dermal leishmaniasis (oriental sore) found in a survey of the district of Hehia are reported and a description of the lesions and causative organisms is given. Diathermy coagulation is recommended as the most satisfactory form of local treatment.

Edna M. Reynolds.

Magnus, J. A. **Correction of ptosis by two strips of fascia lata.** Brit. Jour. Ophth., 1936, v. 20, Aug., pp. 460-464.

Briefly reviewing the technique of Everbusch, Hess, Motais, and Derby in correction of ptosis, the author states his preference for the method of Lexer of Munich, not so well known in England. The lagophthalmos common to the better known methods is absent in the Lexer operation. The seven steps of the operation are clearly explained. Magnus also finds the Lexer method easier when the levator is not completely paralyzed. (Five figures.)

D. F. Harbridge.

Petragnani, Vittorio. **Mycotic dacryocanaliculitis.** Boll. d'Ocul., 1936, v. 15, May, pp. 525-534.

A woman of 48 years had had epiphora of the right eye for a few months. A dense pus came from the lower punctum and with a probe introduced through the upper canaliculus a hard body was felt near the sac. This proved to be a round gray concretion 2 mm. in diameter. Microscopic examination shows numerous mycelial filaments, not identified. (Bibliography, one figure.) M. Lombardo.

Tobgy, A. F. **Plastic operations for the restoration of the upper lid.** Bull. Ophth. Soc. Egypt, 1935, v. 28, p. 21. (See Amer. Jour. Ophth., 1936, v. 19, May, p. 445.)

NEWS ITEMS

Edited by H. ROMMEL HILDRETH
640 S. Kingshighway, St. Louis

News items should reach the Editor by the twelfth of the month.

Deaths

Dr. James William Leech, Providence, R.I., died October 6, 1936, aged 55 years.

Dr. George Oliver Sharrett, Cumberland, Md., died August 27, 1936, aged 49 years.

Dr. Henry Beckles Chandler, Arcadia, Calif., died October 7, 1936, aged 81 years.

Miscellaneous

The American Board of Ophthalmology will conduct an examination at Los Angeles, Saturday, January 23, 1937. All applications for this examination should be filed before December 1st, and case reports must be submitted before January 1st. For information please write at once to: Dr. John Green, Secretary, 3720 Washington Blvd., St. Louis, Mo.

The Annual Conference of the National Society for the Prevention of Blindness will be held in Columbus, Ohio, December 3, 4, and 5, 1936. Local official and unofficial agencies are actively coöperating in the arrangements for the Conference. Among the sessions that have been planned are: Eye health in relation to social work; Rehabilitation vs. relief; Sight-saving classes in the public schools; Eye health of college students; Teacher educaton on eye health; Joint dinner meeting with the Columbus Medical Society; Saving eyesight in industry; The nurses' approach to eye health.

Societies

The first European Congress of Plastic Surgery was held in Brussels on October 3 and 4, 1936.

The fourth Congress of the Latin Medical Press was held in Venice September 29 to October 3, 1936, under the patronage of the Italian Ministry of National Education.

Personals

After the revolution broke out in Catalonia, Dr. Arruga and his family removed to Toulouse, France, and Dr. Barraquer to Marseille.

Dr. Derrick T. Vail has been appointed professor and head of the Department of Ophthalmology in the University of Cincinnati College of Medicine, to succeed the late Dr. Clarence King.

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